

VPDES PERMIT PROGRAM FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a **Major Municipal** permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et seq. Construction of this facility is expected to be completed in September, 2011. The proposed discharge will result from the operation of an advanced sewage treatment plant [STP] serving Alleghany County, the Town of Clifton Forge and the Town of Iron Gate. This permit action consists of reissuing the permit for a five year term. SIC Code: 4952

- 1. Facility Name and Address:** Lower Jackson River Regional WWTP
50 Fork Farm Road
Iron Gate, VA 24448

Location: 50 Fork Farm Road (Route 727), Alleghany County

- 2. Permit No. VA0090671** **Existing Permit Expiration Date:** September 28, 2016
- 3. Owner Contact:** Name: Mr. Gary Hepler
Title: Assistant Director, Public Works, Alleghany County
Telephone No: (540) 863-6650

- 4. Application Complete Date:** July 6, 2016
Permit Drafted By: Lewis J. Pillis, Blue Ridge Regional Office Date: July 6, 2016
Reviewed By: Kirk Batsel Date: July 8, 2016
Public Comment Period Dates: from August 18, 2016 to September 18, 2016

- 5. Receiving Stream Name:** Jackson River River Mile: 0.76
Basin: James River (Upper) Subbasin: N/A Section: 12 Class: IV Special Standards: None
7-Day, 10-Year Low Flow (7Q10): 129 MGD 1-Day, 10-Year Low Flow (1Q10): 119 MGD
7Q10 High Flow months: 191 MGD 1Q10 High Flow months: 154 MGD
30-Day, 5-Year Low Flow (30Q5): 156 MGD Harmonic Mean Flow (HM): 353 MGD
30-Day, 10-Year Low Flow (30Q10): 141 MGD
Tidal? NO On 303(d) list? **YES**

- 6. Licensed Operator Requirements:** I
7. Reliability Class: II
8. Permit Characterization:

- (Private) (Federal) (State) (POTW)
(Possible Interstate Effect) (Interim Limits in Other Document (attach to Fact Sheet))

9. Discharge Description: Table I

OUTFALL NUMBER	DISCHARGE SOURCE	TREATMENT	FLOW*
001	Domestic sewage from: Selma, Cliffton Park, and Westgate areas of Alleghany County Botetourt Community of Iron Gate. Little industrial wastewater No Significant Industrial Users	5 stage Bardenpho Activated Sludge Process UV disinfection Post aeration Landfilling of sludge	2 tiers: 2.6 MGD 3.5 MGD
002	Storm water from the WWTP vicinity, 5.51ac 8.3% impervious	Overland flow through vegetation	~ 5 gpm

* The facility began operation in September, 2011. Population served about 5400.

- 10. Sludge Use or Disposal:** The permit application and sludge management plan specifies that sludge will be disposed of at the Amelia landfill located in Amelia County, Jetersville, VA. The DEQ solid waste facility permit number for this landfill is #540.
- 11. Discharge Location Description:** USGS Topo is included in Appendix A
Name of Topo: Clifton Forge Quadrangle Number: 159D
- 12. Materials Stored:** none at present.
- 13. Ambient Water Quality Information:**

The Jackson River is about 150 feet wide with a rocky bottom at the discharge location. The river channel is rectangular, so that the width does not change significantly at low flow. Since flow in the River is regulated by Gathright Dam, critical low flows have not changed since 2006. This information was previously used in the DEQ Regional desktop Dissolved Oxygen Model. Changes in flow patterns from the Dam have been proposed as a method of controlling periphyton growth in the River. If low flows change as a result of operational changes in the Dam, then the Model will be rerun.

A list of dischargers and sampling stations on the Jackson and James Rivers is in Appendix B.

The USGS published new low flow characteristics of Virginia Streams in 2011. Stream flows from 1895 through 2007 were used in this publication. Since flows in the James River have been regulated by Gathright Dam since 1979, this publication does not accurately present current critical flows for the James River. Critical flows were developed by DEQ using only flows after the Dam began operating. A flow frequency memo is presented in Appendix B.

STORET Data Station #2-JKS000.38

This Station is just downstream from the facility. Data has been collected since 1974 through the 2012. The newest data from, 2005 to 2012, will most accurately portray the River conditions immediately upstream of the WWTP. Only 5 of these data points are after the WWTP began

operation. The ninety percentile pH and temperature data points for the Jackson River at this station, from 2005 through August 2011 are 8.1 S.U. and 23.5°C respectively.

Hardness monitoring has not been conducted recently, and values from 2000 to 2003 averaged 139 mg/L.

Ammonia's expected value from 1999-2003 was 0.021 mg/L, although ammonia was detected in only 4 of 52 River samples. Since the Clifton Forge WWTP will not discharge once the LJRR WWTP starts up, zero background ammonia was assumed in developing the WLA. In the more recent data set, 2005-2012, ammonia was only sampled 6 times during 2011 and averaged 0.1 mg/L with one sample at 0.52 mg/L. the high data point may have been influenced by start-up of the LJRR WWTP.

TMDL information

The Lower Jackson River Regional (LJRR) WWTP will discharge into the upper watershed (VAW-I09R) of the James River at river mile 0.76 of the Jackson River.

The *2010 List of Impaired (Category 5) Waters* (See Appendix D), listed an impairment of the general Water Quality Standard in approximately 24 river miles of the Jackson River. The segment of the Jackson River that was impaired began just downstream of the Covington water intake and extended downstream to the James River (Jackson River mile 0.00). The section of the River receiving the LJRR discharge, 9.81 miles from the mouth of Karnes Creek downstream to the confluence of the Cowpasture and Jackson Rivers, was delisted in 2012.

Two TMDLs previously proposed for the James River below the LJRR WWTP, for non-support of aquatic life, have been eliminated from the impaired waters list. Water quality in these segments has improved over past years and the water in these segments is no longer impaired. Stream segment VAW-I18R, extended from the confluence of the Jackson and Cowpasture Rivers downstream to the Craig Creek confluence [15.36 mi]. Segment VAW-I24R-01 extended from Craig Creek downstream [4.99 mi] to above the mouth of Catawba Creek. This segment was listed in 1998 303(d) for General Standard (benthic) impairment, but improvements in this reach allowed for de-listing, which was approved by EPA on 3/27/2008.

Polychlorinated Biphenyls

Fish consumption has not been declared to be impaired by PCBs (by the VDH) in the vicinity of Iron Gate or the Lower Jackson River Regional WWTP. Fish in the James River, downstream of this facility below Glasgow, and in the Jackson River, upstream between Covington and Low Moor, contain levels of PCBs that make fish consumption unhealthy.

Chesapeake Bay information

Since the discharge will enter the Chesapeake Bay (Bay), Waste Load Allocations [WLAs] for total nitrogen [TN] and total phosphorus [TP] have been promulgated by the *Water Quality Management Planning Regulation*, 9VAC 25-720, to protect the Bay from nutrient enrichment. The facility has obtained a General Permit, VAN040069, pursuant to the *Regulation For Nutrient Enriched Waters And Dischargers Within The Chesapeake Bay Watershed* , 9 VAC25-40.

- 14. Antidegradation Review & Comments:** Tier 1 ____ Tier 2 X Tier 3 _____
The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

An antidegradation review begins with a Tier determination. Impairment listing for this segment of the Jackson River was removed from the 304b/303d list (i.e. delisted) in 2012. The James River begins less than a mile downstream and has been determined to fully support the aquatic life standard and is a tier 2 water. Some segments of the Jackson River were delisted in 2008. These waters are also now designated as Tier 2. Limitations in this permit were developed in accordance with §303(d)(4) of the Clean Water Act.

- 15. Site Visit for reissuance:** November 21, 2014, by Chad Williams and April 22, 2011, by Lewis Pillis, Permit Writer. The site visit memo may be found in Appendix A.
- 16. Effluent Screening & Limitation Development:** Water Quality Standards (WQSS) Monitoring and Discharge Monitoring Report data were used for limit analysis, and have been included in Appendix C.

Outfall 001 data submitted on the permit application or from Attachment A monitoring:

<u>Parameter</u>	<u>Maximum concentration, ug/L</u>
Copper, total	15
Copper, dissolved	< 5
Zinc, total	50
Zinc, dissolved	18.8
Hardness, as CaCO ₃	131, 109 (mg/L)
Chloride	23.6 (mg/L)
Toluene	6
Bis (2-ethylhexyl) phthalate	0.34
Hydrogen sulfide	< 50

Table II provides the basis for effluent limitations and monitoring requirements associated with the permit parameters. Specific parameters are discussed in detail below.

TABLE IIa.EFFLUENT LIMITATIONS

() Interim Limitations
 (X) Final Limitations

OUTFALL NO. 001
 DESIGN FLOW: 2.6 MGD

EFFECTIVE DATES - From: CTO issuance
 To: Permit Expiration Date

PARAMETER	BASIS FOR LIMITS	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow	NA	NL	NA	NA	NL	Continuous	TIRE
pH (S. U.)	1, 2	NA	NA	6.0	9.0	1/Day	Grab
BOD ₅	2	30 mg/L 295 kg/d	45 mg/L 443 kg/d	NA	NA	1/Week	24-hour Composite
Total Suspended Solids	1	30 mg/L 295 kg/d	45 mg/L 443 kg/d	NA	NA	1/Week	24-hour Composite
Dissolved Oxygen	2	NA	NA	6.0 mg/L	NA	1/Day	Grab
Total Nitrogen (TN)	1	6.0 mg/L*	NA	NA	NA	1/Week	24-hour Composite
Total Phosphorus (TP)	1	0.3 mg/L*	NA	NA	NA	1/Week	24-hour Composite
TN (Jun – Oct)	2	NL mg/L			19906 lb	1/Year	Calculated
TP (Jun – Oct)	2	NL mg/L			1659 lb	1/Year	Calculated
<i>E. coli</i> , number /100ml	2	126	NA	NA	NA	1/day	Grab**

NA = Not Applicable NL = No Limitations; monitoring only TIRE = Totalizing, Indicating, and Recording Equipment

*concentration limit is annual average ** geometric mean, samples collected between the hours of 10 am – 4 pm

The basis for the limitations codes are:

1. Technology-based limits: 40CFR133, Secondary Treatment Regulation; 9 VAC 25-40-70, Strategy for Chesapeake Bay Watershed
2. Water Quality Standards, 9VAC25-260
3. Best Professional Judgment

TABLE IIb. EFFLUENT LIMITATIONS
 OUTFALL NO. 001 EFFECTIVE DATES - From: expansion CTO issuance
 DESIGN FLOW: 3.5 MGD To: Permit Expiration Date

() Interim Limitations
 (X) Final Limitations

PARAMETER	BASIS FOR LIMITS	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow	NA	NL	NA	NA	NL	Continuous	TIRE
pH (S. U.)	1, 2	NA	NA	6.0	9.0	1/Day	Grab
BOD ₅	2	26 mg/L 344 kg/d	39 mg/L 517 kg/d	NA	NA	5/Week	24-hour Composite
Total Suspended Solids	1	30 mg/L 397 kg/d	45 mg/L 596 kg/d	NA	NA	5/Week	24-hour Composite
Dissolved Oxygen	2	NA	NA	6.0 mg/L	NA	1/Day	Grab
Total Nitrogen (TN)	1	3.0 mg/L*	NA	NA	NA	1/Week	24-hour Composite
Total Phosphorus (TP)	1	0.3 mg/L*	NA	NA	NA	1/Week	24-hour Composite
TN (Jun – Oct)	2	NL mg/L			19906 lb	1/Year	Calculated
TP (Jun – Oct)	2	NL mg/L			1659 lb	1/Year	Calculated
<i>E. coli</i> , number /100ml	2	126	NA	NA	NA	1/Day	Grab**

NA = Not Applicable NL = No Limitations; monitoring only TIRE = Totalizing, Indicating, and Recording Equipment

*concentration limit is annual average ** geometric mean, samples collected between the hours of 10 am – 4 pm

The basis for the limitations codes are:

1. Technology-based limits: 40CFR133, Secondary Treatment Regulation; 9 VAC 25-40-70, Strategy for Chesapeake Bay Watershed
2. Water Quality Standards, 9VAC25-260
3. Best Professional Judgment

BOD₅ – BOD limits were developed when the Jackson River was considered a tier 1 water. Discharges from Westvaco (AKA MeadWestvaco and WestRock) dominated the allocations for the River. As the pollutant loads from Westvaco discharges were reduced, the impaired area was also reduced. The Jackson River was delisted in 2008 and starting at that time was a tier 2 water.

The DEQ desktop model predicts that the dissolved oxygen WQS of 5 mg/L will not be violated if the 2.6 MGD discharge is limited to a monthly average BOD₅ of 30 mg/L and a TKN of 9 mg/L. Monthly average and maximum weekly average BOD limits remain at 30 mg/L and 45 mg/L respectively. A TKN limit is not needed since this WWTP is subject to the Watershed GP. The TN concentration used to develop the GP is lower than 9 mg/L and more restrictive at 6 mg/L.

BOD concentration in the effluent is controlled by the TN limit (which includes ammonia) discharged. As such, monitoring for BOD is not needed as often and according to the DEQ Permit Manual, MN-2, 1/week should be adequate, as long as TN is monitored 5days/week. Over the past three years BOD has been consistently less than the QL. A reduced monitoring frequency of 1/wk is appropriate.

Modeling performed previously detailed in the *Report for Water Quality Model of the Jackson/James River*, HydroQual, Inc. June 2001, (Diurnal Model) found the lowest river dissolved oxygen [DO] concentration 7.5 miles below the Lower Jackson River WWTP. The Agency desk top dissolved oxygen model was run starting at the proposed outfall and extending 11.8 miles downstream to the confluence with Sinking Creek. The five segments used in the DEQ desktop model were:

Segment No.	End of segment	Segment length, Miles	Elevation start-end	Drainage area added by tributary sq. mi.	Drainage area at end of segment, sq. mi.
0					904.5
1	Cowpasture River	0.78	995-990	461	1365
2	Lick Run	0.76	990-985	(use gage data)	1373
3	Glen Wilton STP 0.020 mgd	2.88	985-970	not applicable	1377
4	Big Creek	1.1	970-965	4.76	1382
5	Sinking Creek	6.24	965-923	22	1416

Calculated river slopes and velocities correlated well with those used in the Diurnal Model. Published drainage areas were used, when available, or were estimated from Figure 4-2 of the Diurnal Model.

Since BOD of 5 mg/L in the Jackson River was documented in the HydroQual report, this was used as background carbonaceous BOD was used in the model. In the same manner, a background TKN of 1.2 mg/l was used in the model. DO predicted by the HydroQual model just upstream of the subject WWTP, 5.6 mg/L, was used as background DO.

For the higher future flow tier, a 3.5 MGD discharge, the minimum DO in the model was just above 5.0 mg/L, using an effluent BOD of 26 mg/L. Therefore, this BOD₅ is used as the monthly average concentration limit and the weekly average limit is 1.5 times the monthly average, using the standard practice developed in the Federal secondary treatment regulation. BOD₅ loading limits are calculated using the new design flow.

Dissolved Oxygen (DO) – Since a DO of 6.0 mg/l was assumed in the WWTP effluent for the DO model runs that established the BOD limit, a DO effluent limitation of 6.0 mg/L is added to the permit. Continuous pH monitoring is used for operational control only and is not used for compliance purposes. Daily DO monitoring is required.

TSS - Total Suspended Solids monthly average and maximum weekly average limits are technology-based, in accordance with federal effluent guidelines (40 CFR Part 133) definition of secondary treatment. These are the same as the current permit. Monitoring is reduced to once a week, since DMR data has been consistently less than 10% of the effluent limits.

pH - The pH range of 6.0 - 9.0 SU is specified in the Water Quality Standards for Class IV streams. It is also required by the Federal secondary treatment regulation (40 CFR Part 133). Continuous pH monitoring is used for operational control only and is not located at the final outfall. A daily pH grab sample is collected to report on the DMR. For these reasons, pH monitoring will use daily grab samples.

Total Residual Chlorine (TRC) – Chlorine limits are removed from the permit Since the use of UV is new information that was not available previously, removal of TRC limits is allowed by an exception to backsiding in the Clean Water Act.

Escherichia coli – The limit is set equal to the WQS. To measure the effectiveness of disinfection, daily testing is recommended by Agency guidance.

Total Nitrogen & Total Phosphorus - The Jackson River is in the Chesapeake Bay watershed. The facility has obtained a Watershed General Permit, VAN040069, pursuant to 9VAC 25-820-10 et seq., that will regulate nutrient impacts on the Bay. Since the Clifton Forge WWTP rerouted its influent wastewater to the LJRR WWTP, the Bay TN and TP allocations for both facilities were combined and assigned to the LJRR WWTP.

Annual loads for TN and TP from the WTP have been:

Year	Flow, ave	lbs TN	lbs TP
2013	1.04	17877	568
2014	0.925	14648	345
2015	1.00	14592	308

The Bay TN WLA is 63957 lbs/yr [29010.4 kg/yr]. The equivalent annual average concentration

needed to meet this limit would be 6.0 mg/L TN.

The Bay TP WLA is 5330 lbs/yr [2417.65 kg/yr]. The equivalent annual average concentration to meet this limit would be 0.5 mg/l TP.

Annual Average Concentration Limits

Strategy for Chesapeake Bay watershed, 9 VAC 25-40-70 A, authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. The annual average concentration limit for TN, for the 2.6 MGD facility, was set at 6.0 mg/L and annual average concentration limit for TP at 0.3 mg/L.

When the 3.5 MGD WWTP is constructed, pursuant to 9 VAC 25-40-70 A, the nitrogen and phosphorus effluent limits will be equal to the “Limit of Technology”. Therefore, annual average limits specified in 9 VAC 25-40-70, 3.b apply, TN = 3.0 mg/L and TP = 0.3 mg/L.

Seasonal Nutrient Limits

A local TMDL for the Jackson River, to remove aquatic life impairments, has been approved by EPA. The growing season allocations for the LJRR WWTP are 1,659 lbs TP, 1,111 lbs orthophosphate (PO₄-P) and 19,906 lbs TN. A growing season is defined in the TMDL, as June – October. The WLAs are based on a discharge of 0.5 mg/L TP, 0.335 mg/L PO₄-P and 6 mg/L TN at the design flow of 2.6 MGD. Since the ratio of TP/PO₄-P is very constant in a STP with little industrial sources, PO₄-P does not need to be monitored. Orthophosphate will be monitored for the permit application, so the ratio can be verified.

For the 3.5 MGD plant, the same loading is applied. While the effective concentration required is reduced, only the seasonal load needs to be limited.

Weekly monitoring is needed to show compliance with the Bay TMDL. This same frequency will be required by this permit

Toxics

The MIX.EXE Agency program was used to determine the percentage of receiving stream flow that may be used in the analysis of permit limits. Results indicate that 100% of the 7Q10 flows and 20% of the 1Q10 flows may be used. The resulting flows were then used in the waste load allocation (WLA) spreadsheet, along with the receiving stream and effluent pH and temperature values, to calculate the water quality criteria and waste load allocations (WLAs) for each parameter.

Maximum effluent temperature and pH estimates from the 2016 permit application used were 24.4C and 8.2 SU. The ninety percentile pH, from data reported on DMRs, was 7.9SU.

Ammonia

The LJRR WWTP must meet an annual average TN level of 3 mg/L. Therefore, in the absence of effluent data, a single datum of 9 mg/L was used as estimated effluent data for ammonia in the

Agency's STATS.EXE program. Using the most limiting WLAs, results indicate that no limits are needed to protect aquatic life from acute or chronic toxicity. Routine effluent monitoring for TN in the permit will confirm that ammonia limits are not needed.

Other WQS Pollutants

Total copper, at 15 ug/L and total zinc at 50 ug/L, were measured in the discharge. Using the most limiting WLAs and the STATS program, no limits are needed to protect aquatic life from acute or chronic aquatic toxicity. The zinc Human Health WLA is one thousand times higher than the aquatic life WLA and does not require a limit to be protected.

Toluene, at 6 ug/L and bis (2-ethylhexyl) phthalate, at 0.34 ug/L were also reported in the effluent. Both of these are several orders of magnitude lower than the Human Health WLAs, 37,000 and 300 ug/L respectively. Limitations for these pollutants are not required.

Copies of the MIX.EXE results, STORET data, effluent data, WLA spreadsheet, and STATS.EXE results are included in Appendix C.

OUTFALL 002 (stormwater only)

Data submitted with permit application:

<u>Parameter</u>	<u>Maximum concentration, mg/L</u>
COD	11
TN	0.67 (estimated load from storm = 2536 mg or 0.0056 lb)
TP	0.07 (estimated load from storm = 265 mg or 0.00058 lb)
TSS	27 (estimated load from storm = 102.2 g or 0.23 lb)
<i>E. coli</i>	55/100 ml

The permittee estimated there were 1000 gallons of runoff from the storm event that was sampled.

The facility qualifies for coverage under a No Exposure Certification (NEC). No industrial activities are exposed to storm water. Procedures are in place to clean spills if they occur on roadways. Discharge from outfall 002 is authorized as long as conditions of no exposure are maintained.

If there is a change in circumstances which causes exposure of industrial activities or materials to storm water, the owner must comply immediately with all the storm water program requirements of the VPDES Permit Regulation. At any future time, DEQ retains the right to inspect the property to confirm the condition of no exposure

- 17. Basis for Sludge Use & Disposal Requirements:** This facility does not intend to land apply sludge, but will dispose of sludge in the Amelia landfill in Jetersville, VA. Therefore, no limitations or monitoring requirements for sludge will be included in the permit.
- 18. Antibacksliding Statement:** all limits are at least as stringent as in the previous permit
- 19. Compliance Schedules:** none

20. Special Conditions:

a. Compliance Reporting Under Part I A (Part I.C.1)

Rationale: Authorized by VPDES Permit Regulation, 9 VAC 25-31-190 J 4 and 220 I. This condition is necessary when toxic pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

b. 95% Capacity Reopener (Part I.C.2)

Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 B 4 for all POTW and PVOTW permits.

c. Indirect Dischargers (Part I.C.3)

Rationale: Required by the VPDES Permit Regulation, 9 VAC 25-31-200 B 1and B 2, for Publicly Owned Treatment Works.

d. CTO, CTC, (Part I.C.4)

Rationale: Required by Code of Virginia § 62.1-44.19; Sewage Control and Treatment Regulations, 9 VAC 25-790.

e. O&M Manual Requirement (Part I.C.5)

Rationale: Required by Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790; VPDES Permit Regulation, 9VAC25-31-190 E.

f. Licensed Operator Requirement (Part I.C.6)

Rationale: The VPDES Permit Regulation, 9 VAC 25-31-200 C and The Code of Virginia 54.1-2300 et seq, Rules and Regulations for Waterworks and Wastewater Works Operators, (18 VAC 160-20-10 et seq.), requires licensure of operators.

g. Reliability Class (Part I.C.7)

Rationale: Required by Sewerage Collection and Treatment Regulations, 9 VAC 25-790 for all municipal facilities.

h. Nutrient Enriched Waters Reopener (Part I.C.8)

Rationale: Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed, 9VAC25-40 allows reopening of permits to impose monitoring requirements for discharges into waters designated as nutrient enriched in the Water Quality Standards at 9VAC25-260-350 if total phosphorus and total nitrogen in a discharge potentially exceed specified concentrations. The policy anticipates that future nutrient limits may be needed to control undesirable aquatic plant growth. 9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9 VAC 25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

i. Sludge Reopener (Part I.C.9)

Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-220 C for all permits issued to treatment works treating domestic sewage.

i. Sludge Use and Disposal (Part I.C.10)

Rationale: VPDES Permit Regulation, 9 VAC 25-31-100 P; 220 B 2; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal. Details of hauling sludge to a landfill are presented in the permit application.

j. Total Maximum Daily Load (TMDL) Reopener (Part I.C.11)

Rationale: Section 303(d) of the Clean Water Act requires that total maximum daily loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under section 303 of the Act.

k. Effluent Monitoring Frequency (Part I.C.12)

Rationale: Permittees are granted a reduction in monitoring frequency based on a history of permit compliance. To remain eligible for the reduction, the permittee should not have violations related to the effluent limits for which reduced frequencies were granted. If permittees fail to maintain the previous level of performance, the baseline monitoring frequencies should be reinstated for those parameters that were previously granted a monitoring frequency reduction.

m. Pretreatment (Part I.D.)

Rationale: VPDES Permit Regulation, 9 VAC 25-31-730 through 900, and 40 CFR part 403 require certain existing and new sources of pollution to meet specified regulations.

n. Whole Effluent Toxicity (WET) Testing (Part I.E.)

Rationale: VPDES Permit Regulation, 9 VAC 25-31-210 and 220 I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. WET test results have been excellent; however, EPA application form 2A requires a minimum of four years of annual WET testing.

The facility will continue annual acute and chronic testing using *Pimephales promelas* and *Ceriodaphnia dubia* for the life of the permit. The Agency's Guidance Memo 00-2012 was used to develop this condition and the Agency WETLIM10 spreadsheet, revised 1/10/2005, (see Appendix C) was used to calculate the acute and chronic endpoints. If the mean of the data exceeds 1.0 TUa or 9.82 TUC a WET limit may result.

o. Conditions Applicable to All Permits, Part II

Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

21. Changes to Permit:

Table II. Changes to Permit

Outfall No.	Parameter Changed	Monitoring Requirement Changed		Effluent Limits Changed		Rationale	Date and Initials
		From	To	From	To		
001	BOD/TSS	5/wk	1/wk	NC		TN controls treatment & reduced monitoring	LJP 4/29/16

Special Conditions changed:

1. O&M, language updated
2. Compliance Reporting Under Part I A & B, language updated
3. Former I.C.10, WQS monitoring, deleted, data has been submitted and no new data is being requested.
4. Former I.C.12, New discharges which are permitted from Form 2A and 2F deleted
5. WET testing revised to continue annual testing. Four years of current WET testing is required by the EPA form 2A application.
6. Storm water conditions removed, NEC applied.

22. Variances/Alternate Limits or Conditions: None.

23. Regulation of Users (9 VAC 25-31-280 B 9): There are no significant industrial users contributing to the treatment works. A survey must be performed and submitted to DEQ to determine the industrial dischargers to the WWTP.

24. Public Notice Information required by 9 VAC 25-31-280 B:

All pertinent information is on file and may be inspected, and copied by contacting Lewis J. Pillis at: Virginia DEQ, 3019 Peters Creek Road, Roanoke, VA 24019, telephone no. (540) 562-6789, or lewis.pillis@deq.virginia.gov.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer and of all persons represented by the commenter/requester, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state 1) the reason why a hearing is requested; 2) a brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and 3) specific

references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may review the draft permit and application at the DEQ Blue Ridge Regional Office, in Roanoke, by appointment.

Following the comment period, the Board will make a determination regarding the proposed reissuance. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

25. Additional Comments:

Previous Board Action: In response to overflows, bypasses, and effluent limit violations, the Board issued a Consent Order in 1999 to Clifton Forge, Alleghany County, and the Town of Iron Gate. The 1999 Order required Alleghany County to construct a new sewage treatment plant [STP] by December 31, 2004, and reduce inflow and infiltration in the sewage collection system. An amended Order, approved by the Board at their meeting of September 6, 2006, required submittal of a schedule for constructing the new STP and included a deadline of December 31, 2010, for elimination of overflows caused by excessive I&I.

Staff Comments: The discharge is not controversial and is in conformance with the existing TMDL documents for the area. In a memo dated June 13, 2016, The Virginia Department of Health, Office of Drinking Water commented that there are no raw water intakes within 15 miles downstream of the proposed discharge.

The Department of Conservation and Recreation provided information, in a letter dated July 8, 2016, on the Roughhead shiner, which is classified as a species of special concern by the United States Fish and Wildlife Service, and stated that the current activity will not affect any documented state-listed plants or insects.

In an email dated 6/17/2016, the United States Fish and Wildlife Service [FWS] commented that it appeared that no impacts to federally listed species or designated critical habitat will occur and had no further comments.

Public Comment: No comments on the draft permit were received.

26. 303(d) Listed Segments (TMDL):

This facility discharges directly to the Jackson River. The stream segment receiving the effluent, VAW-I09R, was delisted, for non attainment of the general standard (benthic), in the current approved 303(d) list.

WLAs were defined in an approved TMDL report and remain in this permit. In the final report “Benthic TMDL Development for the Jackson River, Virginia”, dated June 2010, prepared by the Louis Berger Group, excessive periphyton growth and accumulation has been identified as the “end-point stressor”, or cause of impairment. Reduction of nutrients was identified in this

study as the most practical method of removing the impairment. The TMDL was approved by EPA 07/21/2010. The TMDL that has been prepared for this segment has a WLA for this discharge.

Special Permit considerations:

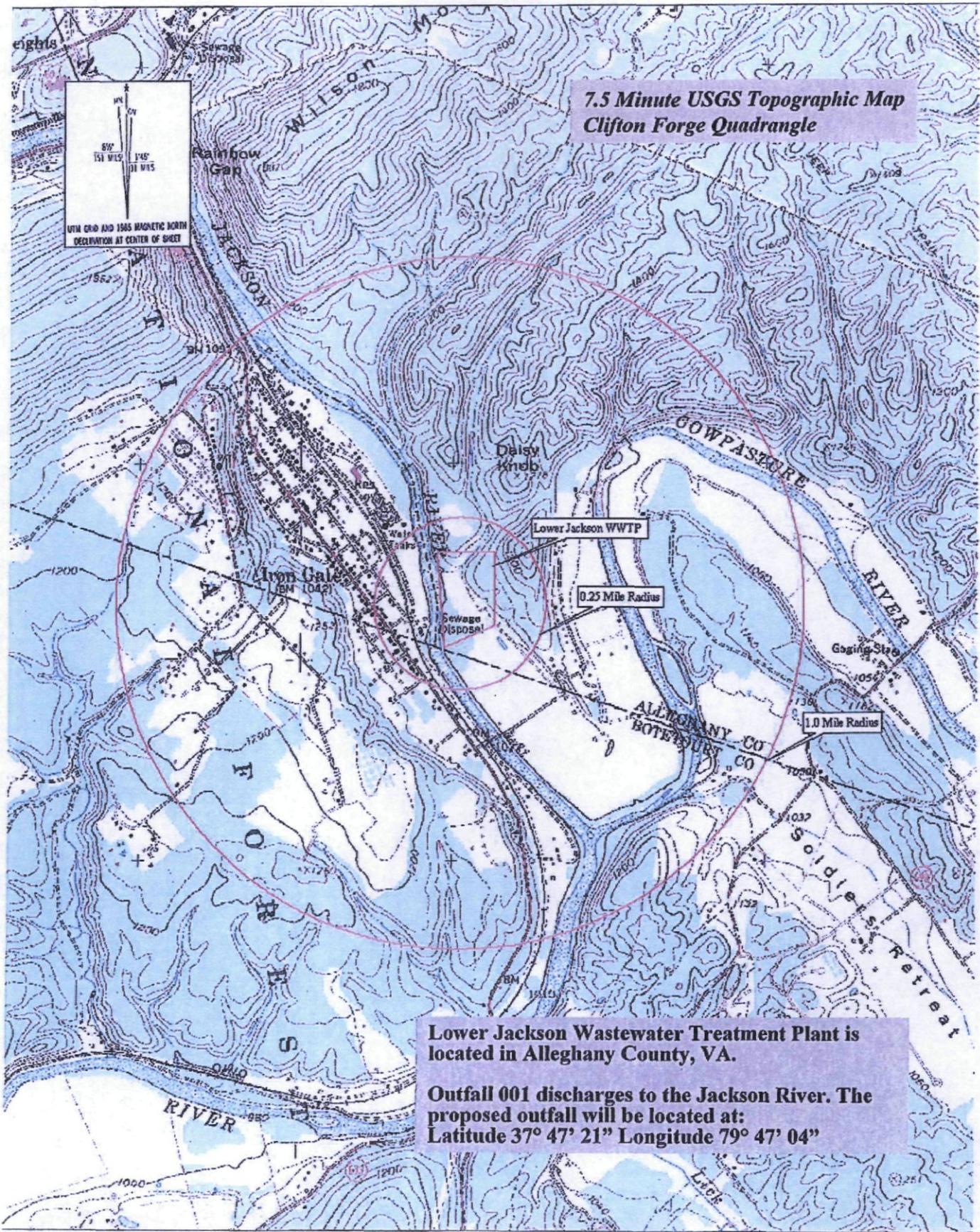
TMDL reopeners have been added to the permit.

List of Appendices

- APPENDIX A Facility information: Flow Diagram, USGS Map, Site Visit Memo
- APPENDIX B Receiving Stream Information: Flow Frequency Memorandum, Mix.exe printout, Receiving Stream data
- APPENDIX C Effluent Limitation Development: Regional Dissolved Oxygen Model excerpt from Jackson River TMDL (Wasteload Allocation), Water Quality Standards and WET endpoint calculation spreadsheets, STATS.EXE output
- APPENDIX D Impaired Waters Fact Sheet

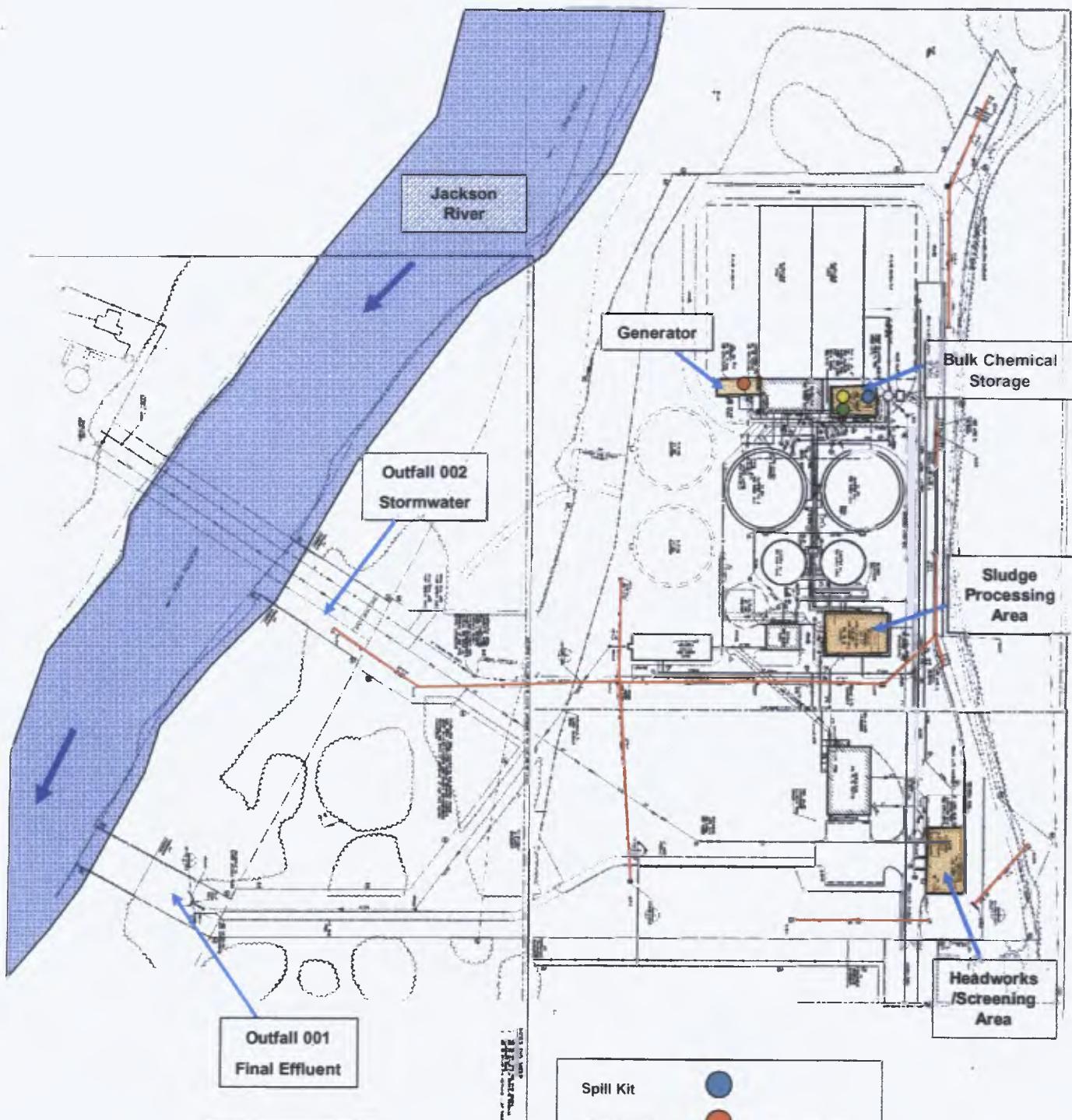
APPENDIX A

Facility Information



Attachment One

Lower Jackson Regional WWTP Facility Map



Spill Kit	(Blue circle)
Diesel AST	(Red circle) = 3,500 Total Gal
Alum, 48% AST	(Green circle) = 9,000 Total Gal
NaOH, 50% AST	(Yellow circle) = 9,000 Total Gal
Separate Storm Sewer	(Orange line)



Lower Jackson Regional WWTP Projected SW Flow Map



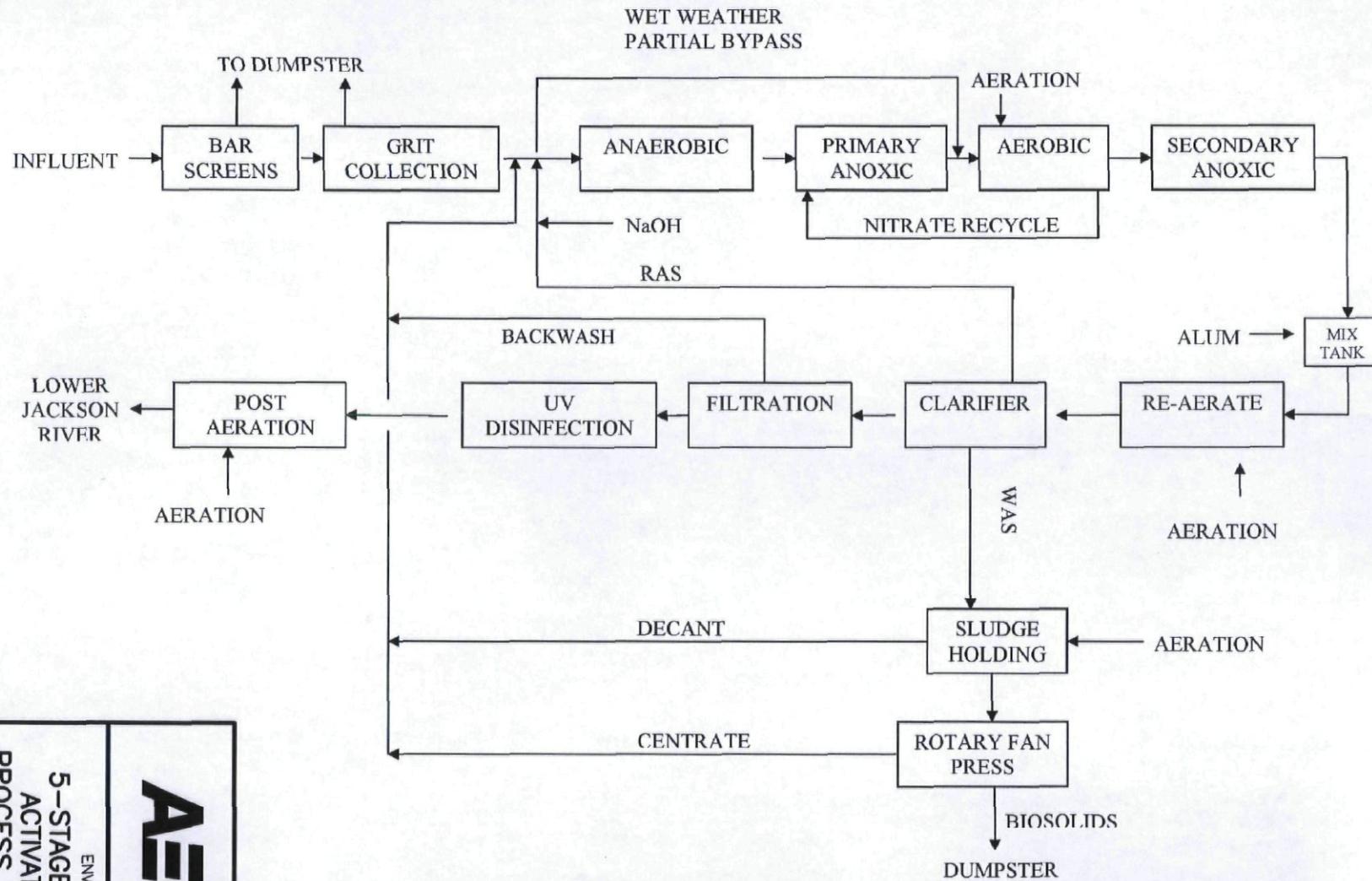
Separate Storm Sewer

Projected SW Flow

Direction of Storm
Sewer Flow



ATTACHMENT #2



LOWER JACKSON RIVER REGIONAL WWTP - 2.6 MGD

AECOM

ENVIRONMENTAL

5-STAGE BARDENPPO
ACTIVATED SLUDGE
PROCESS FLOW DIAGRAM

MARCH 2011

60186P

FIG.5

ALLEGHANY COUNTY, VIRGINIA

Lower Jackson River Regional WWTP

Form 2A Item B.3 – Process Narrative

The Lower Jackson River Regional WWTP is 2.6 MGD wastewater treatment facility which includes Pretreatment, biological and chemical removal, filtration, ultra-violet disinfection, post aeration and sludge management processes.

Wastewater enters the treatment facility at the Headworks Building via a 20" force main from the Iron Gate Pump station. A traveling screen is utilized for screening debris from the wastewater. A manual bar screen is also provided. Grit removal is accomplished using a vortex grit removal system. From the Headworks Building wastewater is conveyed to the Aeration Basins via a 24" gravity pipeline.

The treatment facility is equipped with two Aeration Basins utilizing the Bardenpho Activated sludge process. Wastewater enters the first pre-anoxic zone where it is mixed with Return Activated Sludge from the clarifiers before entering the second pre-anoxic zone. In the second pre-anoxic zone flow is mixed with recycled flow from the end of the aeration tank before flowing into the third and fourth pre-anoxic zones. Nitrogen removal is accomplished in the pre-anoxic zones by converting nitrate and nitrite to oxygen and nitrogen gas, which escapes to the atmosphere.

Flow from the fourth pre-anoxic zone enters the aeration basin. In the aeration tank biological oxygen demand is reduced and ammonia is converted to nitrite and nitrate. The aeration tank is provided with an internal recirculation pump which recirculates up to 300% of the influent zone to the second pre-anoxic zone. From the end of the aeration basin flow enters four post-anoxic zones where additional nitrogen removal is accomplished. In the final post-anoxic zone aluminum sulfate is added prior to flowing to the clarifiers.

The facility is equipped with two centerflow clarifiers. In the clarifiers solids from the mixed liquor from the aeration tank are settled which is pumped back to first pre-anoxic basin tank and mixed with incoming wastewater from the headworks. Clear water overflows the clarifier weirs and flows to the tertiary filters.

The facility is equipped with two cloth media filters which further reduce any particulate matter in the wastewater from the clarifiers. The filters are equipped with filter back wash filters and sludge pumps. Material from the filter back wash is pumped to the filter back wash pump station and subsequently back to the headworks building. Sludge that accumulates in the bottom of the filter tanks is pumped to the aerobic digesters. The filters are equipped with continuous turbidity meters. Effluent from the filters then flows to the UV and NPW shed.

Filter effluent flows to the UV channel which is equipped with two banks of UV lights consisting of forty UV bulbs per bank. The UV system is equipped with an automatic cleaning system to insure the bulbs remain free of debris. From the UV channel, wastewater flows to the post aeration tanks and NPW tank.

The Post Aeration tank is equipped with two blowers and series of diffusers which aerates the wastewater to insure adequate dissolved oxygen content prior to discharge to the Jackson River. The aeration tanks have continuous pH and dissolve oxygen meters.

The NPW tank is equipped with three NPW pumps which supply all the hydrants, wash down equipment and HVAC water demands inside the plant.

Two aerobic digesters are provided. Waste activated sludge is pumped from the return sludge from the clarifiers. Three positive displacement pumps are used to aerate the digester sludge. Sludge from the digesters is pumped to a rotary fan press located in the Solids building.

Sludge from the digesters are pumped to the Rotary fan press which dewateres the sludge. Dewatered sludge is collected in to a hopper which is transported to Amelia Landfill for discposal.

M E M O R A N D U M

DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office

3019 Peters Creek Road

Roanoke, VA 24019

SUBJECT: Site Visit, Lower Jackson River Regional WWTP, Alleghany County

TO: File

FROM: Lewis Pillis

DATE: April 22, 2011

COPIES:

Today, Christopher Clark, Alleghany County Public Works Director, and Brian White, of ESS, accompanied me on a brief tour of the site. All buildings are under roof and the major treatment units have been constructed. One of the bioreactor basins was full of water for testing. Construction is expected to be complete by the end of summer.

ESC measures have been installed, but a lot of the storm water is ponding on the site. A storm water outlet to the River is present about 200 feet upstream of outfall 001. Some of the inlets were observed. Contributions to the outlet are 1) off site storm water, 2) a grated inlet adjacent to the solids handling building and 3) a grade inlet south of the clarifiers and west of the UV area. Off-site storm water empties into earthen ditches on the east, west and south sides of the WWTP and reenters the storm drain in a manhole south of the plant before being discharged. The site has not been brought to final grade, so it was not possible to determine flow directions on the site.

Both the effluent and storm water outfalls appeared to be constructed according to DCR specs, with the outlets at grade and the ditches protected with riprap.

Effluent will enter the River just upstream of a riffle area. The pool behind the riffle area is small and the river is moving fairly rapidly in this area. At the Rt. 727 bridge, small rocks line the River bottom and the rocks appear to have a brown coating on them.

Alleghany Co - Lower Jackson River Regional WWTP
VA0090671

data reported to DEQ on DMRs

limit =>	FLOW, MGD			BOD, mg/L			TSS, mg/L			pH, SU		E. coli	
				Max wk		Max wk		Max wk					
	Mo	ave	Ann ave	Mo	ave	Mo	ave	30	45	Min	Max	#/100ml	
2013		2.6								6.0	9.0	126	
	1	1.1	3.587		2	0	5	2		7.1	7.8	1	
	2	1	3.404	<QL	<QL	1	1			7.1	7.8	1	
	3	1.2	2.117	0.3	1	1	1			6.9	7.6	1	
	4	1.1	2.298	<QL	<QL	2	3			6.9	7.6	1	
	5	1.3	3.899	<QL	<QL	1	2			6.8	7.7	1	
	6	1.4	4.731	<QL	<QL	1	2			7	7.8	1	
	7	1.6	4.875	<QL	<QL	1	2			7	7.7	1	
	8	0.6	0.917	<QL	<QL	<QL	<QL			7.2	7.8	1	
	9	0.6	1.388	<QL	<QL	0.1	0.3			7.1	7.8	1	
	10	0.5	1.271	<QL	<QL	0.04	0.2			7.2	7.9	1	
	11	0.6	2.695	<QL	<QL	0.18	0.76			7.1	7.9	2	
2014	12	1.5	3.606	1.04	<QL	<QL	1	3			6.8	7.4	1
	1	1.1	2.829	<QL	<QL	1	1			6.8	7.2	1	
	2	1.7	3.44	<QL	<QL	1	1			6.6	7.1	1	
	3	1.3	2.842	<QL	<QL	1	1			6.9	7.4	1	
	4	1.2	2.599	<QL	<QL	1	1			6.7	7.3	1	
	5	1.1	2.667	<QL	<QL	0.4	1			6.5	7.8	1	
	6	0.6	1.322	<QL	<QL	<QL	<QL			7.1	8	1	
	7	0.6	1.247	<QL	<QL	0.1	0.2			7.4	7.9	1	
	8	0.6	1.271	<QL	<QL	0.4	1			7.4	7.9	1	
	9	0.5	0.788	<QL	<QL	<QL	<QL			7.5	7.9	1	
	10	0.8	2.189	<QL	<QL	<QL	<QL			6.9	8	2	
	11	0.7	2.361	<QL	<QL	0.4	1			6.9	7.8	1	
2015	12	0.9	2.129	0.925	<QL	<QL	<QL	<QL		7	7.7	1	
	1	0.9	1.909	<QL	<QL	0.2	1			6.9	7.7	1	
	2	0.7	1.557	<QL	<QL	<QL	<QL			6.8	7.7	1	
	3	1.6	4.254	<QL	<QL	0.3	1			6.9	7.6	1	
	4	1.7	4.772	<QL	<QL	1	1			7	7.7	1	
	5	0.7	1.814	<QL	<QL	1	2			7.1	8.2	1	
	6	0.7	2.403	<QL	<QL	<QL	<QL			7	7.9	1	
	7	0.9	2.556	0.2	1	0.2	0.2			7.1	7.7	1	
	8	0.5	1.311	<QL	<QL	0.11	0.24			7.3	8	1	
	9	0.6	3.7	<QL	<QL	0.3	0.5			7.3	7.9	1	
	10	1.1	3.295	<QL	<QL	0.1	0.2			7.1	7.8	1	
	11	1	2.816	<QL	<QL	0.1	1			7.1	8.1	1	
2016	12	1.6	3.472	1.00	<QL	<QL	0.2	1		7	7.8	1	
	1	0.9	1.596	<QL	<QL	<QL	<QL			7	7.5	1	
min/max	2	2.1	4.459		<QL	<QL	1	1		6.9	7.4	1	
				0.5/2.1						6.5	8.2		

Alleghany Co - Lower Jackson River Regional WWTP
VA0090671

data reported to DEQ on DMRs

limit =>	NITROGEN, TOTAL (AS N)					PHOSPHORUS, TOTAL (AS P)				
	mg/L	lb	lb	mg/L		mg/L	lb	lb	mg/L	
	Mo ave	Mo total	Jun-Oct	An ave	19906	Mo ave	Mo total	Jun-Oct	0.3	
2013	1	3.6	946			0.07	31			
	2	4.4	1249			0.06	28			
	3	3.3	1104			0.07	25			
	4	3.5	846			0.11	30			
	5	3.8	1404			0.14	53			
	6	4.1	2013			0.14	60			
	7	8.6	3007			0.2	78			
	8	5.5	806			0.2	31			
	9	5.9	870			0.23	30			
	10	7.9	1094	7790	5.6	0.21	31	230		
	11	10.1	1128			0.15	16			
	12	6.3	3410			0.2	155		0.3	
2014	1	6	1305			0.21	33			
	2	6	2632			0.08	20			
	3	5.1	1891			0.14	43			
	4	3.9	1170			0.15	46			
	5	5.4	1395			0.21	42			
	6	2.9	414			0.16	23			
	7	5	682			0.4	17			
	8	4.6	632			0.14	21			
	9	5.2	747			0.13	17			
	10	7.2	1364	3839	5.3	<QL	36	107		
	11	6.6	900			0.17	24			
	12	5.1	1516			0.1	23		0.1	
2015	1	4.1	822			0.08	17			
	2	5.9	1008			0.11	18			
	3	4.5	1612			0.06	21			
	4	4.9	2175			0.1	48			
	5	4.1	791			0.12	22			
	6	4.7	570			0.12	14			
	7	4.7	1274			0.21	58			
	8	3.6	524			0.11	15			
	9	5	780			0.1	16			
	10	7.8	1736	4884	4.9	0.11	28	131		
	11	5.7	1440			0.07	22			
	12	4.6	1860			0.06	29		0.1	
2016	1	4.6	1163			0.14	32			
	2	4.1	2624			0.06	48			
min/max		2.9/10.1	414/3410			0.06/0.4	14/155			

Table 1 Acute Toxicity Test Data for the LJRR WWTP; VA0090671; Outfall 001;
Endpoint LC₅₀ = 33%

Test Date - Quarter	Test Organism	LC ₅₀ (%)	% Survival in 100% Effluent	Testing Laboratory
3/6/12 – 1*	<i>C. dubia</i>	>100	100	CBI
3/6/12 – 1*	<i>P. promelas</i>	>100	100	CBI
6/20/12 - 2	<i>C. dubia</i>	>100	100	CBI
6/20/12 - 2	<i>P. promelas</i>	>100	100	CBI
8/29/12 - 3	<i>C. dubia</i>	>100	100	CBI
8/29/12 - 3	<i>P. promelas</i>	>100	100	CBI
11/13/12 - 4	<i>C. dubia</i>	>100	100	CBI
11/13/12 - 4	<i>P. promelas</i>	>100	100	CBI
3/20/13 – 5	<i>C. dubia</i>	>100	100	CBI
3/20/13 – 5	<i>P. promelas</i>	>100	100	CBI
6/19/13 – 6	<i>C. dubia</i>	>100	100	CBI
6/19/13 - 6	<i>P. promelas</i>	>100	100	CBI
8/28/13 - 7	<i>C. dubia</i>	>100	100	CBI
8/28/13 - 7	<i>P. promelas</i>	>100	100	CBI
10/30/13 - 8	<i>C. dubia</i>	>100	100	CBI
10/30/13 - 8	<i>P. promelas</i>	>100	100	CBI
3/12/14 – 9	<i>C. dubia</i>	>100	100	CBI
3/12/14 – 9	<i>P. promelas</i>	>100	100	CBI
6/18/14 - 10	<i>C. dubia</i>	>100	100	CBI
6/18/14 - 10	<i>P. promelas</i>	>100	100	CBI
7/22/15 – A1	<i>C. dubia</i>	>100	100	CBI
7/22/15 – A1	<i>P. promelas</i>	>100	100	CBI

* Notes:

Q1 samples collected as time composites rather than flow proportional composites

Table 2 Chronic Toxicity Test Data for the LJRR WWTP; VA0090671; Outfall 001;
Endpoint NOEC \geq 4%

Test Date - Quarter	Test Organism	NOEC Survival (%)	NOEC Growth or Reproduction (%)	% Survival in 100% Effluent	Testing Laboratory
3/5/12 – 1*	<i>C. dubia</i>	100	100	100	CBI
3/5/12 – 1*	<i>P. promelas</i>	100	100	93	CBI
6/19/12 - 2	<i>C. dubia</i>	100	100	100	CBI
6/19/12 - 2	<i>P. promelas</i>	100	100	88	CBI
8/24/12 - 3	<i>C. dubia</i>	100	100	100	CBI
8/24/12 - 3	<i>P. promelas</i>	100	100	100	CBI
11/13/12 - 4	<i>C. dubia</i>	100	100	100	CBI
11/13/12 - 4	<i>P. promelas</i>	100	100	100	CBI
3/19/13 - 5	<i>C. dubia</i>	100	100	90	CBI
3/19/13 - 5	<i>P. promelas</i>	100	100	98	CBI
6/18/13 - 6	<i>C. dubia</i>	100	100	100	CBI
6/18/13 - 6	<i>P. promelas</i>	100	100	98	CBI
8/27/13 - 7	<i>C. dubia</i>	100	100	100	CBI
8/27/13 - 7	<i>P. promelas</i>	100	100	92.5	CBI
10/29/13 - 8	<i>C. dubia</i>	100	100	100	CBI
10/29/13 - 8	<i>P. promelas</i>	100	100	97.5 ^c	CBI
3/11/14 - 9	<i>C. dubia</i>	100	100	100	CBI
3/11/14 - 9	<i>P. promelas</i>	100	100	100	CBI
6/17/14 - 10	<i>C. dubia</i>	100	100	100	CBI
6/17/14 - 10	<i>P. promelas</i>	100	100	100	CBI
7/22/15 - A1	<i>C. dubia</i>	100	100	100	CBI
7/22/15 - A1	<i>P. promelas</i>	100	100	97.5c	CBI

* Notes:

c indicates same % survival as control

Q1 samples collected as time composites rather than flow proportional composites

APPENDIX B

Receiving Stream Information

M E M O R A N D U M

DEPARTMENT OF ENVIRONMENTAL QUALITY
West Central Regional Office

3019 Peters Creek Road

Roanoke, VA 24019

SUBJECT: Flow Frequency Determination, Lower Jackson River STP,
VPDES Permit No. VA0090671

TO: File

FROM: Lewis Pillis *ZP*

DATE: March 6, 2006

COPIES:

Critical flows for the gages used in preparing the referenced permit have changed since development of the last permit. Eugene Powell, DEQ-Office of Surface Water Investigations, updated the gage statistics in 2005. Critical flows for the Jackson and James River gages includes flows released from Gathright dam in these calculations. Using the same method that was employed in the issuance of the subject permit, flows from the Cowpasture River near Clifton Forge (# 02016000), were subtracted from flows of the James River at Lick Run (# 02016500), which is about 4 miles downstream of the discharge point. Drainage area proportions were then used to project critical flows at the discharge point. Since the Clifton Forge STP will simultaneously go offline when discharge from the Lower Jackson River STP begins, this flow is also subtracted from the critical river flow. The attached spreadsheet details these calculations.

Critical flows at the discharge point once the Clifton Forge STP goes offline are:

1Q10 – 119 MGD
7Q10 – 129 MGD
30Q10 – 141 MGD
30Q5 – 156 MGD
HF 1Q10 – 154 MGD
HF 7Q10 – 191 MGD
HF 30Q10 – 226 MGD
Harmonic Mean – 353 MGD

High Flow Months – JAN - MAY
Period Used – 1980– 2003

QUAD	REGION	DAAREA	HARMEAN	HF30Q10			HF7Q10		HF1Q10		Z30Q5		Z30Q10		Z7Q10		Z1Q10		Z1Q30	
				cfs																
02016500	James River at Lick Run, Va.	Clifton Forge	WCRO	1373	745	479	393	325	315	286	261	242	200							
02016000	Cowpasture River near Clifton Forge, Va.	Clifton Forge	WCRO	461	191	124	92	82	69	63	56	53	47							
	James River at Lick Run, Va. MINUS Cowpasture River			912	554	355	301	243	246	223	205	189	153							
James River	at outfall for Lower Jackson River STP	Drainage area proportions	904.5/912 0.991776	549	352	299	241	244	221	203	187	152								
		convert to MGD:																		
James River at Lick Run, Va.	Clifton Forge	WCRO		481	310	254	210	204	185	169	156	129								
Cowpasture River near Clifton Forge, Va.	Clifton Forge	WCRO		123	80	59	53	45	41	36.2	34.3	30.4								
Less Clifton Forge STP contribution				355	228	193	156	158	143	131	121	98								
Final critical flows at Lower Jackson STP				2	2	2	2	2	2	2	2	2								
				353	226	191	154	156	141	129	119	96								

mix 2_6 MGD.txt

Mixing Zone Predictions for

Lower Jackson 2.6 MGD

Effluent Flow = 2.6 MGD
Stream 7Q10 = 129 MGD
Stream 30Q10 = 141 MGD
Stream 1Q10 = 119 MGD
Stream slope = 0.0016 ft/ft
Stream width = 148 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.7662 ft
Length = 12816.15 ft
Velocity = .7793 ft/sec
Residence Time = .1903 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.8619 ft
Length = 12254.82 ft
Velocity = .8066 ft/sec
Residence Time = .1758 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.6837 ft
Length = 13347.09 ft
Velocity = .7554 ft/sec
Residence Time = 4.908 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 20.37% of the 1Q10 is used.

virginia DEQ Mixing Zone Analysis Version 2.1

mix 3_5 mgd.txt

Mixing Zone Predictions for

LJRR WWTP 3.5MGD

Effluent Flow = 3.5 MGD
Stream 7Q10 = 129 MGD
Stream 30Q10 = 141 MGD
Stream 1Q10 = 119 MGD
Stream slope = 0.0016 ft/ft
Stream width = 148 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.7735 ft
Length = 12771.32 ft
Velocity = .7814 ft/sec
Residence Time = .1892 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.8692 ft
Length = 12213.94 ft
Velocity = .8086 ft/sec
Residence Time = .1748 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.6912 ft
Length = 13296.84 ft
Velocity = .7576 ft/sec
Residence Time = 4.8753 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 20.51% of the 1Q10 is used.

virginia DEQ Mixing Zone Analysis Version 2.1

Dischargers and Sampling Stations on the Jackson - James River

Diurnal 2006 DEQ

ONAME	FNAME	FIPS	OUTFALLNO	DIS_FLOW	DISCHCAT	STRCODE	RIVERMI	model mile	model mile
APXB station	One Mile below McClintic - Sta. No. 4			A	2-JKS053.48-TL			53.48	
APXB station	Bolar Mtn. Campground - Sta. No. 3			A	2-JKS048.90-BL			48.90	
APXB station	Bolar Mtn. Campground - Sta. No. 3			A	2-JKS048.90-TL			48.90	
APXB station	WQS - Lake Moomaw (Lower Lake)			C	2-JKS047.06			47.06	
APXB station	Conflu. w/Big Lick Cr. - Sta. No. 2			A	2-JKS046.40-BL			46.40	
APXB station	Conflu. w/Big Lick Cr. - Sta. No. 2			A	2-JKS046.40-TL			46.40	
APXB station	Dam - Station No. 1			A	2-JKS044.60-BL			44.60	
APXB station	Dam - Station No. 1			A	2-JKS044.60-TL			44.60	
APXB station	Below Gathwright Dam at gage			A	2-JKS044.10			44.10	
U.S. Army Corps of Engineers	Morris Hill STP	005	001	0.01500	Sewage	JKS		43.55	
APXB station	Near Camp Appalachia			B	2-JKS039.01			39.01	
Sponaugle, Frank	Sponaugle Subd.	005	001	0.01600	Sewage	JKS		34.93	
APXB station	Rt. 687 Bridge - Clearwater Park			A,B,SS	2-JKS030.65			30.65	
APXB station	Covington Water Filtration Plant			SS1, SS2	2-JKS026.01			26.01	
Covington, City of	Jackson R. WTP		001	4.0000	Intake	Jackson R.		26.00	
WESTVACO	WESTVACO		002		Intake	Jackson R.		25.88	
WESTVACO	WESTVACO		003		Intake	Jackson R.		25.56	
WESTVACO	WESTVACO		004		Intake	Jackson R.		25.52	
WESTVACO	WESTVACO	005	007		Storm Water	JKS		25.44	
WESTVACO	WESTVACO	005	005		Storm Water	JKS		25.36	
WESTVACO	WESTVACO	005	006		Storm Water	JKS		25.20	
WESTVACO	WESTVACO		005		Intake	Jackson R.		25.09	
WESTVACO	WESTVACO		006		Intake	Jackson R.		25.08	
Martin County Coal Corporation	Coal Handling Facility	005	006	0.00000	Storm Water	JKS		24.96	
WESTVACO	WESTVACO	005	001	33.00000	Storm Water	JKS		24.92	
WESTVACO	WESTVACO	005	008	0.00000	Storm Water	JKS		24.84	
WESTVACO	WESTVACO		007		Intake	Jackson R.		24.80	
WESTVACO	WESTVACO		008		Intake	Jackson R.		24.69	
WESTVACO	WESTVACO	005	002	23.20000	Storm Water	JKS		24.68	
WESTVACO	WESTVACO	005	003	27.60000	Process	JKS		24.64	
WESTVACO	WESTVACO	005	009	0.00000	Storm Water	JKS		24.52	
WESTVACO	WESTVACO	005	010	0.00000	Storm Water	JKS		24.48	
WESTVACO	WESTVACO	005	011	0.00000	Storm Water	JKS		24.47	
WESTVACO	WESTVACO	005	012	0.00000	Storm Water	JKS		24.26	
WESTVACO	WESTVACO	005	013	0.00000	Storm Water	JKS		24.25	
APXB station	Rt. 60 Bridge			SS	2-JKS024.20			24.20	
APXB station	City Park - Covington at gage			A,B	2-JKS023.61			23.61	
APXB station	City Park - Covington at gage			SS	2-JKS023.61			23.61	
APXB station	Swinging Bridge			SS	2-JKS023.32			23.32	
APXB station	Fudge's Bridge, Rt. 154, Covington			SS	2-JKS022.78			22.78	
APXB station	Industrial Park behind Walmart			SS1, SS2	2-JKS022.15			22.15	
Applied Extrusion Technologies, Inc	AET - Covington Plant	580	004		Storm Water	JKS		21.07	
APXB station	S. Rayon Dr. Bridge, Covington			SS	2-JKS021.06			21.06	
Applied Extrusion Technologies, Inc	AET - Covington Plant	580	002	0.60000	Fire Water Storage Tanks	JKS		19.72	
Applied Extrusion Technologies, Inc	AET - Covington Plant	580	001	0.90000	Process	JKS		19.22	
Applied Extrusion Technologies, Inc	AET - Covington Plant	580	003	0.00000	Storm Water	JKS		19.22	
Covington, City of	Covington STP	580	001	3.00000	Sewage	JKS		19.03	
APXB station	Rt. 18 Bridge at Covington			A,B,SS	2-JKS018.68			18.68	
APXB station	Byrd's Farm East of Covington			SS	2-JKS017.30			17.30	
APXB station	Byrd's Farm #2			SS	2-JKS017.03			17.03	
APXB station	Between I-64 & CSX Railroad N/Mallow			SS	2-JKS015.80			15.80	

Dischargers and Sampling Stations on the Jackson - James River

Diurnal 2006 DEQ

ONAME	FNAME	FIPS	OUTFALLNO	DIS_FLOW	DISCHCAT	STRCODE	RIVERMI	model mile	model mile
APXB station	Island Ford Cave above Low Moor			SS	2-JKS013.45		13.45		
APXB station	Off Rt. 696 above Lowmoor			A,B	2-JKS013.29		13.29		
APXB station	Island Ford Bridge, Rt. 1101			SS	2-JKS011.92		11.92		
Alleghany County	Low Moor STP	005	001		0.5 Sewage	JKS	10.05		
APXB station	Low Water Bridge - near Dabney Lancaster			A,B	2-JKS006.67		6.67	0	
CSX Transportation, Inc.	Clifton Forge	560	001	0.05470	Process	JKS	4.72	1.95	
Clifton Forge, City of	Clifton Forge STP	560	001	2.00000	Sewage	JKS	3.46	3.21	
Parker Hannifin Corp.	Parker Hannifin Powertrain Div.	005	002	0.32300	Cooling-Contact	JKS	1.21	5.46	
Parker Hannifin Corp.	Parker Hannifin Powertrain Div.	005	001	0.02300	Process	JKS	1.17	5.50	
Parker Hannifin Corp.	Parker Hannifin Powertrain Div.	005	999	0.02300	Process	JKS	1.17	5.50	
Alleghany Co.	Proposed Lower Jackson river STP				Sewage		0.76	5.91	0
APXB station	Rt. 727 Bridge - near Iron Gate			A	2-JKS000.38		0.38	6.29	0.38
Confluence of Cowpasture and Jackson						JMS	346.49	6.67	0.76
APXB station	Rt. 220 Bridge - near Gage			B	2-JMS345.73		345.73	7.43	1.52
Botetourt County	Glen Wilton STP	023	001	0.02000	Sewage	JMS	342.85	10.31	4.40
APXB station	James R. at Salisbury			A,B	2-JMS326.30		326.30	26.86	20.95
Botetourt County	Buchanan STP	023	001	0.23750	Sewage	JMS	308.51	44.65	38.74
APXB station	Rt. 501 Bridge - S.E. of Glasgow			A	2-JMS282.28		282.28	70.88	64.97
Georgia Pacific Co	GP, Big Island Plant	019	021	0.00600	Storm Water - Unloading Area	JMS	278.89	74.27	68.36

Station ID

2-JKS000.38

SR 727 at Iron Gate

Field data

0.4 mi downstream of LJRR WWTP

Collection Date Time	Temp	Celc	Do	Probe	Field pH
01/05/2005 11:30	12.34		10.39		7.74
03/29/2005 13:30		10.42		10.95	8.06
05/02/2005 11:00		12.24		10.04	8.08
07/12/2005 11:00		23.4		7.9	7.9
09/28/2005 11:00		20.5		9.7	8.25
11/09/2005 09:30		13.7		9.7	8.1
01/24/2006 10:30		6.6		12.4	7.8
03/30/2006 10:30		10.8		12.7	7.5
05/01/2006 11:00		15.3		10	7
07/31/2006 11:00		24.6		8.4	7.3
09/07/2006 10:30		20.3		9.8	8.1
11/14/2006 15:00		11.4		9.9	8.1
01/10/2007 10:00		6.3		11.1	7.8
03/22/2007 10:00		11		11.2	7.7
05/15/2007 11:30	NULL	NULL	NULL		
07/26/2007 10:00		21		8.9	6.8
09/27/2007 11:00		22.6		8.1	6.5
11/19/2007 11:30		9.8		12.5	6.1
01/08/2008 10:30		8.6		8.6	6.2
03/13/2008 10:30		14.2		9.2	6.6
03/25/2008 10:30		9.7		12.3	7
05/07/2008 10:30		15.9		9.4	6.5
07/29/2008 11:00		24.2		9.5	7.2
09/22/2008 10:30		18.9		8.9	6.8
11/24/2008 10:00		4.5		13.7	7.1
01/22/2009 11:00		1.9		15.9	7.3
03/11/2009 11:30		13.4		11.1	7.3
05/05/2009 11:30		10.2		11.4	6.6
07/07/2009 10:30		20.7		8.4	7.1
09/02/2009 12:00		21.1		9.2	7.2
11/30/2009 11:00		11.1	NULL		7.4
02/24/2010 14:10		5.6		12.2	7.7
04/01/2010 10:15		10.3		11.1	7.8
06/16/2010 10:45		25.3		8.2	7.9
08/17/2010 07:46		24.3		7.3	7.8
10/26/2010 15:00		16.8		10.1	8.1
12/29/2010 14:40		3.5	NULL		8.4
02/17/2011 09:30		7.7		11.9	8
04/20/2011 13:10		11.8	NULL		7.9
06/23/2011 10:30		23.4		7.4	7.4
08/17/2011 11:00		23.1		9.4	8.2
90% =>	23.48			8.1	
10/13/2011 11:45		17.9		9.7	8.2 *
12/29/2011 12:20		6.1		11.6	7.7 *
02/22/2012 11:30		6.5		12.2	7.4 *
03/08/2012 11:00		9.4		11.7	7.1 *
05/24/2012 11:45		17.8		9.3	8.1 *

* after discharge from LJRR WWTP began

25.3 7.3 8.4
max min max

90% =>	23.44	8.1
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using all
data listed

Station 2-JKS006.67

upstream at Dabney Lancaster

Field data

Collection Date	Temp Time	Celcius	Do Probe	Field pH
01/09/2001		4.1	12.5	8.41
02/01/2001		6	12.3	7.99
03/01/2001		7.5	12.1	9.05
04/02/2001		7.7	11.8	8.64
05/01/2001		21.1	10.34	8.89
06/05/2001		20	8.51	8.09
07/19/2001		23.8	7.89	8.2
09/10/2001		23.9	8.38	8.59
11/28/2001		15.2	9.59	8.28
01/22/2002		7	12.67	8.57
03/26/2002		11.9	9.26	7.53
05/23/2002		18.39	12.23	8.56
07/18/2002		24.33	6.59	7.7
09/17/2002		23.45	8.57	8.27
11/18/2002		9.4	10.53	8.19
02/03/2003		8	14.1	8.8
03/25/2003		12.01	11.77	8.43
05/27/2003		14.79	9.78	7.51
10/24/2006		10.6	12.3	8.4
10/26/2006		12.7	10.1	7.8
10/30/2006		12.7	11.9	8.2
02/24/2010		5.4	12.2	7.6
04/01/2010		9.7	11.3	7.7
06/16/2010		27.3	9.9	8
08/16/2010		26.3	9.2	8.3
08/17/2010		26.8	9.5	8.4
08/18/2010		21.1	9.7	8.1
10/26/2010		18.3	9.9	8
12/29/2010		4.3	NULL	8.4
02/16/2011		9.3	14.2	8.3
04/19/2011		9.6	NULL	7.8
06/22/2011		23	7.5	7.1
08/16/2011		22.3	8.5	7.9
10/12/2011		17	8.9	8
12/28/2011		7.2	11.5	7
Max =>		27.3	14.2	9.05
Min =>		4.1	6.59	7
90% =>		24.2		8.6

Station ID 2-JKS000.38

most recent data 00900
HARDNESS,
TOTAL
(MG/L AS
CACO3)

01/13/2000	129
02/24/2000	87
03/28/2000	90
04/19/2000	50
05/15/2000	NULL
05/15/2000	166
06/01/2000	94
07/10/2000	165
08/01/2000	124
09/07/2000	114
10/04/2000	137
11/02/2000	215
12/06/2000	224
01/16/2001	233
02/01/2001	124
03/01/2001	187.9
04/02/2001	29.2
05/01/2001	144
06/05/2001	119
06/28/2001	NULL
07/19/2001	138
08/16/2001	90.3
09/10/2001	200
10/10/2001	209
11/28/2001	182
12/18/2001	159
01/22/2002	217
02/19/2002	205
03/26/2002	143
04/17/2002	104
05/23/2002	144
06/17/2002	163
07/18/2002	171
08/07/2002	182
09/17/2002	191
10/21/2002	195
11/18/2002	68.4
12/16/2002	63.6
02/03/2003	175
03/03/2003	61.3
03/25/2003	45.9
05/01/2003	98.1
06/19/2003	56.9
average =	139

APPENDIX C

Permit Development

Dissolved Oxygen Model
2.6 MGD WWTP

modout LJR - manning's ok at 30BOD 9TKN - 6.5 mgd.txt
"Model Run For C:\Documents and Settings\ljpillis\My Documents\water\Models\stream
model\model runs\lower Jackson\5 segments using Mannings 30BOD 9TKN 6.5 MGD.mod On
2/24/2009 2:18:21 PM"

"Model is for JACKSON - JAMES RIVER."
"Model starts at the LOWER JACKSON RIVER WWTP discharge."

"Background Data"
"7Q10", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
129.436, 5, 1.1, 5.609, 31

"Discharge/Tributary Input Data for Segment 1"
"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
2.6, 30, 9, ,6, 31

"Hydraulic Information for Segment 1"
"Length", "Width", "Depth", "Velocity"
"(mi)", "(ft)", "(ft)", "(ft/sec)"
.78, 147.999, 1.927, .716

"Initial Mix Values for Segment 1"
"Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
132.036, 5.617, 13.731, .512, 7.344, 31

"Rate Constants for Segment 1. - (All units Per Day)"
"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
.7, 1.16, 3.846, 4.993, .25, .583, 0, 0

"Output for Segment 1"
"Segment starts at LOWER JACKSON RIVER WWTP"
"Total", "Segm."
"Dist.", "Dist.", "DO", "cBOD", "nBOD"
"(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
0, 0, 5.617, 13.731, .512
.1, .1, 5.554, 13.596, .509
.2, .2, 5.495, 13.462, .506
.3, .3, 5.44, 13.329, .503
.4, .4, 5.388, 13.198, .501
.5, .5, 5.34, 13.068, .499
.6, .6, 5.295, 12.939, .497
.7, .7, 5.253, 12.812, .495
.78, .78, 5.222, 12.711, .493

"Discharge/Tributary Input Data for Segment 2"
"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
36.2, 2, 0, ,6.611, 31

"Incremental Flow Input Data for Segment 2"
"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
.922, 5, 1.1, ,6.611, 31

"Hydraulic Information for Segment 2"
"Length", "Width", "Depth", "Velocity"
"(mi)", "(ft)", "(ft)", "(ft/sec)"
.76, 155.001, 1.775, .689

modout LJR - manning's ok at 30BOD 9TKN - 6.5 mgd.txt

"Initial Mix Values for Segment 2"
"Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
169.158, 5.527, 11.06, .385, 7.346, 31

"Rate Constants for Segment 2. - (All units Per Day)"
"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
.7, 1.16, 3.947, 5.124, .25, .583, 0, 0

"Output for Segment 2"
"Segment starts at COWPASTURE RIVER"
"Total", "Segm."
"Dist.", "Dist.", "DO", "cBOD", "nBOD"
"(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
.78, 0, 5.527, 11.06, .385
.88, .1, 5.495, 10.947, .383
.98, .2, 5.466, 10.835, .381
1.08, .3, 5.439, 10.724, .379
1.18, .4, 5.414, 10.614, .377
1.28, .5, 5.392, 10.505, .375
1.38, .6, 5.372, 10.397, .373
1.48, .7, 5.354, 10.291, .371
1.54, .76, 5.344, 10.228, .37

"Discharge/Tributary Input Data for Segment 3"
"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
.5, 2, 0, , 6.612, 31

"Incremental Flow Input Data for Segment 3"
"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
0, 5, 1.1, , 6.614, 31

"Hydraulic Information for Segment 3"
"Length", "Width", "Depth", "Velocity"
"(mi)", "(ft)", "(ft)", "(ft/sec)"
2.88, 155.001, 1.778, .613

"Initial Mix Values for Segment 3"
"Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
169.658, 5.348, 10.213, .369, 7.348, 31

"Rate Constants for Segment 3. - (All units Per Day)"
"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
.7, 1.16, 3.125, 4.056, .25, .583, 0, 0

"Output for Segment 3"
"Segment starts at LICK RUN"
"Total", "Segm."
"Dist.", "Dist.", "DO", "cBOD", "nBOD"
"(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
1.54, 0, 5.348, 10.213, .369
1.64, .1, 5.31, 10.096, .367
1.74, .2, 5.275, 9.98, .365
1.84, .3, 5.243, 9.865, .363
1.94, .4, 5.213, 9.752, .361
2.04, .5, 5.186, 9.64, .359

modout LJR - manning's ok at 30BOD 9TKN - 6.5 mgd.txt

2.14,	.6,	5.161,	9.529,	.357
2.24,	.7,	5.138,	9.419,	.355
2.34,	.8,	5.117,	9.311,	.353
2.44,	.9,	5.099,	9.204,	.351
2.54,	1,	5.082,	9.098,	.349
2.64,	1.1,	5.067,	8.993,	.347
2.74,	1.2,	5.054,	8.89,	.345
2.84,	1.3,	5.043,	8.788,	.343
2.94,	1.4,	5.033,	8.687,	.341
3.04,	1.5,	5.025,	8.587,	.339
3.14,	1.6,	5.018,	8.488,	.337
3.24,	1.7,	5.013,	8.39,	.335
3.34,	1.8,	5.009,	8.294,	.333
3.44,	1.9,	5.006,	8.199,	.331
3.54,	2,	5.005,	8.105,	.329
3.64,	2.1,	5.005,	8.012,	.327
3.74,	2.2,	5.006,	7.92,	.325
3.84,	2.3,	5.008,	7.829,	.323
3.94,	2.4,	5.011,	7.739,	.321
4.04,	2.5,	5.015,	7.65,	.319
4.14,	2.6,	5.019,	7.562,	.317
4.24,	2.7,	5.024,	7.475,	.315
4.34,	2.8,	5.03,	7.389,	.313
4.42,	2.88,	5.035,	7.321,	.312

"Discharge/Tributary Input Data for Segment 4"

"Flow", "cBOD5", "TKN", "DO", "Temp"
 "(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
 .02, 30, 15, ,5, 31

"Incremental Flow Input Data for Segment 4"

"Flow", "cBOD5", "TKN", "DO", "Temp"
 "(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
 0, 5, 1.1, ,6.616, 31

"Hydraulic Information for Segment 4"

"Length", "Width", "Depth", "Velocity"
 "(mi)", "(ft)", "(ft)", "(ft/sec)"
 1.1, 160.002, 1.815, .581

"Initial Mix Values for Segment 4"

"Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"
 "(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
 169.678, 5.035, 7.329, .318, 7.351, 31

"Rate Constants for Segment 4. - (All units Per Day)"

"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
 .5, .829, 2.727, 3.54, .25, .583, 0, 0

"Output for Segment 4"

"Segment starts at GLEN WILTON STP"

"Total", "Segm."

"Dist.", "Dist.", "DO", "cBOD", "nBOD"
 "(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
 4.42, 0, 5.035, 7.329, .318
 4.52, .1, 5.055, 7.265, .316
 4.62, .2, 5.075, 7.202, .314
 4.72, .3, 5.095, 7.139, .312
 4.82, .4, 5.115, 7.077, .31
 4.92, .5, 5.135, 7.016, .308

modout LJR - manning's ok at 30BOD 9TKN - 6.5 mgd.txt
 5.02, .6, 5.154, 6.955, .306
 5.12, .7, 5.173, 6.895, .304
 5.22, .8, 5.192, 6.835, .302
 5.32, .9, 5.211, 6.776, .3
 5.42, 1, 5.23, 6.717, .298
 5.52, 1.1, 5.249, 6.659, .296

"Discharge/Tributary Input Data for Segment 5"
 "Flow", "cBOD5", "TKN", "DO", "Temp"
 "(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
 .24, 2, 0, ,6.617, 31

"Incremental Flow Input Data for Segment 5"
 "Flow", "cBOD5", "TKN", "DO", "Temp"
 "(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
 0, 5, 1.1, ,6.622, 31

"Hydraulic Information for Segment 5"
 "Length", "Width", "Depth", "Velocity"
 "(mi)", "(ft)", "(ft)", "(ft/sec)"
 6.24, 149.998, 1.679, .671

"Initial Mix Values for Segment 5"
 "Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"
 "(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
 169.918, 5.251, 6.657, .296, 7.357, 31

"Rate Constants for Segment 5. - (All units Per Day)"
 "k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
 .5, .829, 4.038, 5.242, .25, .583, 0, 0

"Output for Segment 5"
 "Segment starts at BIG CREEK"
 "Total", "Segm."

"Dist.", "Dist.", "DO", "cBOD", "nBOD"
 "(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
 5.52, 0, 5.251, 6.657, .296
 5.62, .1, 5.299, 6.607, .294
 5.72, .2, 5.345, 6.557, .292
 5.82, .3, 5.389, 6.508, .29
 5.92, .4, 5.431, 6.459, .288
 6.02, .5, 5.472, 6.41, .286
 6.12, .6, 5.511, 6.362, .284
 6.22, .7, 5.549, 6.314, .282
 6.32, .8, 5.585, 6.267, .281
 6.42, .9, 5.62, 6.22, .28
 6.52, 1, 5.654, 6.173, .279
 6.62, 1.1, 5.687, 6.127, .278
 6.72, 1.2, 5.718, 6.081, .277
 6.82, 1.3, 5.748, 6.035, .276
 6.92, 1.4, 5.777, 5.99, .275
 7.02, 1.5, 5.805, 5.945, .274
 7.12, 1.6, 5.832, 5.9, .273
 7.22, 1.7, 5.858, 5.856, .272
 7.32, 1.8, 5.884, 5.812, .271
 7.42, 1.9, 5.909, 5.768, .27
 7.52, 2, 5.933, 5.725, .269
 7.62, 2.1, 5.956, 5.682, .268
 7.72, 2.2, 5.978, 5.639, .267
 7.82, 2.3, 6, 5.597, .266

modout LJR - manning's ok at 30BOD 9TKN - 6.5 mgd.txt

7.92,	2.4,	6.021,	5.555,	.265
8.02,	2.5,	6.041,	5.513,	.264
8.12,	2.6,	6.061,	5.472,	.263
8.22,	2.7,	6.08,	5.431,	.262
8.32,	2.8,	6.098,	5.39,	.261
8.42,	2.9,	6.116,	5.349,	.26
8.52,	3,	6.133,	5.309,	.259
8.62,	3.1,	6.15,	5.269,	.258
8.72,	3.2,	6.166,	5.229,	.257
8.82,	3.3,	6.182,	5.19,	.256
8.92,	3.4,	6.197,	5.151,	.255
9.02,	3.5,	6.212,	5.112,	.254
9.12,	3.6,	6.227,	5.074,	.253
9.22,	3.7,	6.241,	5.036,	.252
9.32,	3.8,	6.255,	5,	.251
9.42,	3.9,	6.305,	5,	.25
9.52,	4,	6.353,	5,	.249
9.62,	4.1,	6.399,	5,	.248
9.72,	4.2,	6.442,	5,	.247
9.82,	4.3,	6.483,	5,	.246
9.92,	4.4,	6.522,	5,	.245
10.02,	4.5,	6.56,	5,	.244
10.12,	4.6,	6.596,	5,	.243
10.22,	4.7,	6.622,	5,	.242
10.32,	4.8,	6.622,	5,	.241
10.42,	4.9,	6.622,	5,	.24
10.52,	5,	6.622,	5,	.239
10.62,	5.1,	6.622,	5,	.238
10.72,	5.2,	6.622,	5,	.237
10.82,	5.3,	6.622,	5,	.236
10.92,	5.4,	6.622,	5,	.235
11.02,	5.5,	6.622,	5,	.234
11.12,	5.6,	6.622,	5,	.233
11.22,	5.7,	6.622,	5,	.232
11.32,	5.8,	6.622,	5,	.231
11.42,	5.9,	6.622,	5,	.23
11.52,	6,	6.622,	5,	.229
11.62,	6.1,	6.622,	5,	.228
11.72,	6.2,	6.622,	5,	.227
11.76,	6.24,	6.622,	5,	.227

"END OF FILE"

Dissolved Oxygen Model
3.5 MGD WWTP

modout LJR - manning's ok at 26
"Model Run For C:\water\Models\stream model\model runs\lower Jackson\5 segments
using Mannings 26BOD.mod On 4/4/2006 10:16:04 AM"

"Model is for JACKSON - JAMES RIVER."
"Model starts at the LOWER JACKSON RIVER WWTP discharge."

"Background Data"

"7Q10", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
129.436, 5, 1.1, 5.609, 31

"Discharge/Tributary Input Data for Segment 1"

"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
3.5, 26, 5, .6, 31

"Hydraulic Information for Segment 1"

"Length", "width", "Depth", "Velocity"
"(mi)", "(ft)", "(ft)", "(ft/sec)"
.78, 147.999, 1.935, .718

"Initial Mix Values for Segment 1"

"Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
132.936, 5.62, 13.882, .228, 7.344, 31

"Rate Constants for Segment 1. - (All units Per Day)"
"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
.7, 1.16, 3.846, 4.993, .25, .583, 0, 0

"Output for Segment 1"

"Segment starts at LOWER JACKSON RIVER WWTP"

"Total", "Segm."
"Dist.", "Dist.", "DO", "cBOD", "nBOD"
"(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
0, 0, 5.62, 13.882, .228
.1, .1, 5.557, 13.746, .227
.2, .2, 5.498, 13.611, .226
.3, .3, 5.443, 13.477, .225
.4, .4, 5.391, 13.345, .224
.5, .5, 5.343, 13.214, .223
.6, .6, 5.298, 13.084, .222
.7, .7, 5.256, 12.955, .221
.78, .78, 5.225, 12.853, .22

"Discharge/Tributary Input Data for Segment 2"

"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
36.2, 2, 0, .6, 6.611, 31

"Incremental Flow Input Data for Segment 2"

"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
.922, 5, 1.1, .6, 6.611, 31

"Hydraulic Information for Segment 2"

"Length", "width", "Depth", "Velocity"
"(mi)", "(ft)", "(ft)", "(ft/sec)"
.76, 155.001, 1.78, .69

modout LJR - manning's ok at 26
"Initial Mix Values for Segment 2"
"Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
170.058, 5.528, 11.179, .172, 7.346, 31

"Rate Constants for Segment 2. - (All units Per Day)"
"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
.7, 1.16, 3.947, 5.124, .25, .583, 0, 0

"Output for Segment 2"

"Segment starts at COWPASTURE RIVER"

"Total", "Segm."
"Dist.", "Dist.", "DO", "cBOD", "nBOD"
"(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
.78, 0, 5.528, 11.179, .172
.88, .1, 5.496, 11.065, .171
.98, .2, 5.467, 10.952, .17
1.08, .3, 5.44, 10.84, .169
1.18, .4, 5.415, 10.729, .168
1.28, .5, 5.393, 10.619, .167
1.38, .6, 5.373, 10.51, .166
1.48, .7, 5.355, 10.403, .165
1.54, .76, 5.345, 10.339, .164

"Discharge/Tributary Input Data for Segment 3"
"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
.5, 2, 0, 6.612, 31

"Incremental Flow Input Data for Segment 3"
"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
0, 5, 1.1, 6.614, 31

"Hydraulic Information for Segment 3"
"Length", "Width", "Depth", "Velocity"
"(mi)", "(ft)", "(ft)", "(ft/sec)"
2.88, 155.001, 1.784, .615

"Initial Mix Values for Segment 3"
"Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
170.558, 5.349, 10.323, .164, 7.348, 31

"Rate Constants for Segment 3. - (All units Per Day)"
"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
.7, 1.16, 3.125, 4.056, .25, .583, 0, 0

"Output for Segment 3"

"Segment starts at LICK RUN"

"Total", "Segm."
"Dist.", "Dist.", "DO", "cBOD", "nBOD"
"(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
1.54, 0, 5.349, 10.323, .164
1.64, .1, 5.311, 10.205, .163
1.74, .2, 5.276, 10.088, .162
1.84, .3, 5.244, 9.972, .161
1.94, .4, 5.214, 9.858, .16
2.04, .5, 5.187, 9.745, .159
2.14, .6, 5.162, 9.633, .158

modout LJR - mannings ok at 26

2.24,	.7,	5.139,	9.523,	.157
2.34,	.8,	5.118,	9.414,	.156
2.44,	.9,	5.099,	9.306,	.155
2.54,	1,	5.082,	9.199,	.154
2.64,	1.1,	5.067,	9.094,	.153
2.74,	1.2,	5.054,	8.99,	.152
2.84,	1.3,	5.043,	8.887,	.151
2.94,	1.4,	5.033,	8.785,	.15
3.04,	1.5,	5.025,	8.684,	.149
3.14,	1.6,	5.018,	8.584,	.148
3.24,	1.7,	5.013,	8.486,	.147
3.34,	1.8,	5.009,	8.389,	.146
3.44,	1.9,	5.006,	8.293,	.145
3.54,	2,	5.005,	8.198,	.144
3.64,	2.1,	5.005,	8.104,	.143
3.74,	2.2,	5.006,	8.011,	.142
3.84,	2.3,	5.008,	7.919,	.141
3.94,	2.4,	5.011,	7.828,	.14
4.04,	2.5,	5.015,	7.738,	.139
4.14,	2.6,	5.019,	7.649,	.138
4.24,	2.7,	5.024,	7.561,	.137
4.34,	2.8,	5.03,	7.474,	.136
4.42,	2.88,	5.035,	7.405,	.135

"Discharge/Tributary Input Data for Segment 4"

"Flow", "cBOD5", "TKN", "DO", "Temp"
 "(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
 .02, 30, 15, ,5, 31

"Incremental Flow Input Data for Segment 4"

"Flow", "cBOD5", "TKN", "DO", "Temp"
 "(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
 0, 5, 1.1, ,6.616, 31

"Hydraulic Information for Segment 4"

"Length", "Width", "Depth", "Velocity"
 "(mi)", "(ft)", "(ft)", "(ft/sec)"
 1.1, 160.003, 1.821, .582

"Initial Mix Values for Segment 4"

"Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"
 "(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
 170.578, 5.035, 7.413, .141, 7.351, 31

"Rate Constants for Segment 4. - (All units Per Day)"

"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
 .5, .829, 2.727, 3.54, .25, .583, 0, 0

"Output for Segment 4"

"Segment starts at GLEN WILTON STP"

"Total", "Segm."
 "Dist.", "Dist.", "DO", "cBOD", "nBOD"
 "(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
 4.42, 0, 5.035, 7.413, .141
 4.52, .1, 5.056, 7.349, .14
 4.62, .2, 5.076, 7.285, .139
 4.72, .3, 5.096, 7.222, .138
 4.82, .4, 5.116, 7.159, .137
 4.92, .5, 5.136, 7.097, .136
 5.02, .6, 5.156, 7.036, .135

modout LJR - manning's ok at 26

5.12,	.7,	5.175,	6.975,	.134
5.22,	.8,	5.194,	6.915,	.133
5.32,	.9,	5.213,	6.855,	.132
5.42,	1,	5.232,	6.796,	.131
5.52,	1.1,	5.251,	6.737,	.13

"Discharge/Tributary Input Data for Segment 5"

"Flow",	"CBOD5",	"TKN",	"DO",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
.24,	2,	0,	,6.617,	31

"Incremental Flow Input Data for Segment 5"

"Flow",	"CBOD5",	"TKN",	"DO",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
0,	5,	1.1,	,6.622,	31

"Hydraulic Information for Segment 5"

"Length",	"Width",	"Depth",	"Velocity"	
"(mi)",	"(ft)",	"(ft)",	"(ft/sec)"	
6.24,	149.998,	1.685,	.673	

"Initial Mix values for Segment 5"

"Flow",	"DO",	"CBOD",	"nBOD",	"dosat",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
170.818,	5.253,	6.735,	.13,	7.357,	31

"Rate Constants for Segment 5. - (All units Per Day)"

"k1",	"k1@T",	"k2",	"k2@T",	"kn",	"kn@T",	"BD",	"BD@T"
.5,	.829,	4.038,	5.242,	.25,	.583,	0,	0

"Output for Segment 5"
"Segment starts at BIG CREEK"

"Total",	"Segm."				
"Dist.",	"Dist.",	"DO",	"CBOD",	"nBOD"	
"(mi)",	"(mi)",	"(mg/l)",	"(mg/l)",	"(mg/l)"	
5.52,	0,	5.253,	6.735,	.13	
5.62,	.1,	5.301,	6.685,	.129	
5.72,	.2,	5.347,	6.635,	.128	
5.82,	.3,	5.391,	6.585,	.127	
5.92,	.4,	5.434,	6.536,	.126	
6.02,	.5,	5.475,	6.487,	.125	
6.12,	.6,	5.514,	6.438,	.124	
6.22,	.7,	5.552,	6.39,	.123	
6.32,	.8,	5.589,	6.342,	.122	
6.42,	.9,	5.624,	6.294,	.121	
6.52,	1,	5.658,	6.247,	.12	
6.62,	1.1,	5.691,	6.2,	.119	
6.72,	1.2,	5.722,	6.154,	.118	
6.82,	1.3,	5.752,	6.108,	.117	
6.92,	1.4,	5.781,	6.062,	.116	
7.02,	1.5,	5.809,	6.017,	.115	
7.12,	1.6,	5.836,	5.972,	.114	
7.22,	1.7,	5.862,	5.927,	.113	
7.32,	1.8,	5.888,	5.883,	.112	
7.42,	1.9,	5.913,	5.839,	.111	
7.52,	2,	5.937,	5.795,	.11	
7.62,	2.1,	5.96,	5.752,	.109	
7.72,	2.2,	5.982,	5.709,	.108	
7.82,	2.3,	6.004,	5.666,	.107	
7.92,	2.4,	6.025,	5.624,	.106	

modout LJR - mannings ok at 26

8.02,	2.5,	6.045,	5.582,	.105
8.12,	2.6,	6.065,	5.54,	.104
8.22,	2.7,	6.084,	5.498,	.103
8.32,	2.8,	6.102,	5.457,	.102
8.42,	2.9,	6.12,	5.416,	.101
8.52,	3,	6.137,	5.375,	.1
8.62,	3.1,	6.154,	5.335,	.099
8.72,	3.2,	6.17,	5.295,	.098
8.82,	3.3,	6.186,	5.255,	.097
8.92,	3.4,	6.201,	5.216,	.096
9.02,	3.5,	6.216,	5.177,	.095
9.12,	3.6,	6.231,	5.138,	.094
9.22,	3.7,	6.245,	5.099,	.094
9.32,	3.8,	6.259,	5.061,	.094
9.42,	3.9,	6.273,	5.023,	.094
9.52,	4,	6.286,	5,	.094
9.62,	4.1,	6.335,	5,	.094
9.72,	4.2,	6.382,	5,	.094
9.82,	4.3,	6.427,	5,	.094
9.92,	4.4,	6.47,	5,	.094
10.02,	4.5,	6.511,	5,	.094
10.12,	4.6,	6.55,	5,	.094
10.22,	4.7,	6.587,	5,	.094
10.32,	4.8,	6.622,	5,	.094
10.42,	4.9,	6.622,	5,	.094
10.52,	5,	6.622,	5,	.094
10.62,	5.1,	6.622,	5,	.094
10.72,	5.2,	6.622,	5,	.094
10.82,	5.3,	6.622,	5,	.094
10.92,	5.4,	6.622,	5,	.094
11.02,	5.5,	6.622,	5,	.094
11.12,	5.6,	6.622,	5,	.094
11.22,	5.7,	6.622,	5,	.094
11.32,	5.8,	6.622,	5,	.094
11.42,	5.9,	6.622,	5,	.094
11.52,	6,	6.622,	5,	.094
11.62,	6.1,	6.622,	5,	.094
11.72,	6.2,	6.622,	5,	.094
11.76,	6.24,	6.622,	5,	.094

"END OF FILE"

REGIONAL MODELING SYSTEM VERSION 4.0
**Model Input File for the Discharge
to JACKSON - JAMES RIVER.**

File Information

File Name: C:\water\Models\stream model\model runs\lower Jackson\5 segments using
Date Modified: April 04, 2006

Water Quality Standards Information

Stream Name: JACKSON - JAMES RIVER
River Basin: James River Basin
Section: 12
Class: IV - Mountainous Zones Waters
Special Standards: none

Background Flow Information

Gauge Used: James River at Lick Run
Gauge Drainage Area: 1373 Sq.Mi.
Gauge 7Q10 Flow: 168.7 MGD
Headwater Drainage Area: 904.5 Sq.Mi.
Headwater 7Q10 Flow: 129.436 MGD (Net; includes Withdrawals/Discharges)
Withdrawal/Discharges: 18.3 MGD
Incremental Flow in Segments: 0.1228696 MGD/Sq.Mi.

Background Water Quality

Background Temperature: 31 Degrees C
Background cBOD5: 5 mg/l
Background TKN: 1.1 mg/l
Background D.O.: 5.609402 mg/l

Model Segmentation

Number of Segments: 5
Model Start Elevation: 995 ft above MSL
Model End Elevation: 923 ft above MSL

REGIONAL MODELING SYSTEM VERSION 4.0
**Model Input File for the Discharge
to JACKSON - JAMES RIVER.**

Segment Information for Segment 1

Definition Information

Segment Definition: A discharge enters.
Discharge Name: LOWER JACKSON RIVER WWTP
VPDES Permit No.:

Discharger Flow Information

Flow: 3.5 MGD
cBOD5: 26 mg/l
TKN: 5 mg/l
D.O.: 6 mg/l
Temperature: 31 Degrees C

Geographic Information

Segment Length: 0.78 miles
Upstream Drainage Area: 904.5 Sq.Mi.
Downstream Drainage Area: 912 Sq.Mi.
Upstream Elevation: 995 Ft.
Downstream Elevation: 990 Ft.

Hydraulic Information

Segment Width: 147.999 Ft.
Segment Depth: 1.935 Ft.
Segment Velocity: 0.718 Ft./Sec.
Segment Flow: 132.936 MGD
Incremental Flow: 0.922 MGD (Applied at end of segment.)

Channel Information

Cross Section: Rectangular
Character: Mostly Straight
Pool and Riffle: No
Bottom Type: Small Rock
Sludge: None
Plants: None
Algae: On Entire Bottom

REGIONAL MODELING SYSTEM VERSION 4.0
**Model Input File for the Discharge
to JACKSON - JAMES RIVER.**

Segment Information for Segment 2

Definition Information

Segment Definition: A tributary enters.
Tributary Name: COWPASTURE RIVER

Tributary Flow Information

Flow: 36.2 MGD
cBOD5: 2 mg/l
TKN: 0 mg/l
D.O.: 6.611 mg/l
Temperature: 31 Degrees C

Geographic Information

Segment Length: 0.76 miles
Upstream Drainage Area: 1373 Sq.Mi.
Downstream Drainage Area: 1373 Sq.Mi.
Upstream Elevation: 990 Ft.
Downstream Elevation: 985 Ft.

Hydraulic Information

Segment Width: 155.001 Ft.
Segment Depth: 1.78 Ft.
Segment Velocity: 0.69 Ft./Sec.
Segment Flow: 169.136 MGD
Incremental Flow: 0 MGD (Applied at end of segment.)

Channel Information

Cross Section: Rectangular
Character: Mostly Straight
Pool and Riffle: No
Bottom Type: Small Rock
Sludge: None
Plants: None
Algae: On Entire Bottom

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge
to JACKSON - JAMES RIVER.

Segment Information for Segment 3

Definition Information

Segment Definition: A tributary enters.
Tributary Name: LICK RUN

Tributary Flow Information

Flow: 0.5 MGD
cBOD5: 2 mg/l
TKN: 0 mg/l
D.O.: 6.612 mg/l
Temperature: 31 Degrees C

Geographic Information

Segment Length: 2.88 miles
Upstream Drainage Area: 1377 Sq.Mi.
Downstream Drainage Area: 1377 Sq.Mi.
Upstream Elevation: 985 Ft.
Downstream Elevation: 970 Ft.

Hydraulic Information

Segment Width: 155.001 Ft.
Segment Depth: 1.784 Ft.
Segment Velocity: 0.615 Ft./Sec.
Segment Flow: 169.636 MGD
Incremental Flow: 0 MGD (Applied at end of segment.)

Channel Information

Cross Section: Rectangular
Character: Mostly Straight
Pool and Riffle: No
Bottom Type: Small Rock
Sludge: None
Plants: None
Algae: On Entire Bottom

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge
to JACKSON - JAMES RIVER.

Segment Information for Segment 4

Definition Information

Segment Definition: A discharge enters.
Discharge Name: GLEN WILTON STP
VPDES Permit No.:

Discharger Flow Information

Flow: 0.02 MGD
cBOD5: 30 mg/l
TKN: 15 mg/l
D.O.: 5 mg/l
Temperature: 31 Degrees C

Geographic Information

Segment Length: 1.1 miles
Upstream Drainage Area: 1378 Sq.Mi.
Downstream Drainage Area: 1378 Sq.Mi.
Upstream Elevation: 970 Ft.
Downstream Elevation: 965 Ft.

Hydraulic Information

Segment Width: 160.003 Ft.
Segment Depth: 1.821 Ft.
Segment Velocity: 0.582 Ft./Sec.
Segment Flow: 169.656 MGD
Incremental Flow: 0 MGD (Applied at end of segment.)

Channel Information

Cross Section: Rectangular
Character: Mostly Straight
Pool and Riffle: No
Bottom Type: Small Rock
Sludge: None
Plants: None
Algae: Only On Edges

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge
to JACKSON - JAMES RIVER.

Segment Information for Segment 5

Definition Information

Segment Definition: A tributary enters.
Tributary Name: BIG CREEK

Tributary Flow Information

Flow: 0.24 MGD
cBOD5: 2 mg/l
TKN: 0 mg/l
D.O.: 6.617 mg/l
Temperature: 31 Degrees C

Geographic Information

Segment Length: 6.24 miles
Upstream Drainage Area: 1378 Sq.Mi.
Downstream Drainage Area: 1416 Sq.Mi.
Upstream Elevation: 965 Ft.
Downstream Elevation: 923 Ft.

Hydraulic Information

Segment Width: 149.998 Ft.
Segment Depth: 1.685 Ft.
Segment Velocity: 0.673 Ft./Sec.
Segment Flow: 169.896 MGD
Incremental Flow: 4.669 MGD (Applied at end of segment.)

Channel Information

Cross Section: Rectangular
Character: Mostly Straight
Pool and Ripple: No
Bottom Type: Small Rock
Sludge: None
Plants: None
Algae: Only On Edges

Table 7-7: Phosphorus Waste Load Allocations - Major Dischargers						
Facility Name	VPDES Permit	Discharge Flow (MGD)	TP Conc. (mg/L)	TP Load Allocation (lbs/growing season)	PO4-P Conc. (mg/L)	PO4-P Load Allocation (lbs/growing season)
MeadWestvaco	VA0003646	35	1.5	66,991	0.21*	9,379
Covington STP	VA0025542	3	0.5	1,914	0.335	1,282
Low Moor WWTP	VA0027979	0.3	1.15	440	0.7705	295
Lower Jackson River WWTP	VA0090671	2.6	0.5	1,659	0.335	1,111
Total				71,004	-	12,068

*Measured as filtered orthophosphorus

Table 7-8: Total Nitrogen Waste Load Allocations During the Growing Season Major Dischargers				
Facility Name	VPDES Permit	Discharge Flow (MGD)	TN Conc. (mg/L)	TN Load (lbs/growing season)
MeadWestvaco	VA0003646	35	3.7	165,245
Covington STP	VA0025542	3	6	22,968
Low Moor WWTP	VA0027979	0.3	14	5,359
Lower Jackson River WWTP	VA0090671	2.6	6	19,906
Total				213,478

The allocation for Low Moor WWTP and Lower Jackson River WWTP reflect the aggregated mass load nutrient given to Alleghany County pursuant to 9VAC 25-820-70, Part 1.B.2, otherwise referred to as a "bubble". Accordingly, compliance is determined solely on an aggregate basis rather than by comparison of individual facility waste load allocations.

In addition to the major dischargers, there are 9 active minor facilities holding active individual discharge permits in the Jackson River watershed (4 industrial facilities and 5 municipal facilities). The 4 minor industrial facilities discharge very low level of nutrients. Based on DMR data for a few industrial facilities, the average discharge TP is approximated at 0.34 mg/L and 0.14 mg/l for total nitrogen and total phosphorus, respectively. **Table 7-9** presents the WLAs for the 4 minor industrial facilities for total phosphorus and total nitrogen respectively.

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Lower Jackson River Regional WWTP 2.6 MGD

Permit No.: VA0090671

Receiving Stream: Jackson River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO ₃) =	139 mg/L	1Q10 (Annual) =	119 MGD	Annual - 1Q10 Mix =	20.37 %	Mean Hardness (as CaCO ₃) =	131 mg/L
90% Temperature (Annual) =	23.5 deg C	7Q10 (Annual) =	129 MGD	- 7Q10 Mix =	100 %	90% Temp (Annual) =	24.4 deg C
90% Temperature (Wet season) =	14.2 deg C	30Q10 (Annual) =	141 MGD	- 30Q10 Mix =	100 %	90% Temp (Wet season) =	23 deg C
90% Maximum pH =	8.1 SU	1Q10 (Wet season) =	154 MGD	Wet Season - 1Q10 Mix =	20.37 %	90% Maximum pH =	8.2 SU
10% Maximum pH =	6.5 SU	30Q10 (Wet season) =	182 MGD	- 30Q10 Mix =	100 %	10% Maximum pH =	7 SU
Tier Designation (1 or 2) =	2	30Q5 =	156 MGD			Discharge Flow =	2.6 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	353 MGD				
Trout Present Y/N? =	n						
Early Life Stages Present Y/N? =	y						

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenaphthene	0	--	--	na	9.9E+02	--	--	na	6.0E+04	--	--	na	9.9E+01	--	--	na	6.0E+03	--	--	na	6.0E+03
Acrolein	0	--	--	na	9.3E+00	--	--	na	5.7E+02	--	--	na	9.3E-01	--	--	na	5.7E+01	--	--	na	5.7E+01
Acrylonitrile ^c	0	--	--	na	2.5E+00	--	--	na	3.4E+02	--	--	na	2.5E-01	--	--	na	3.4E+01	--	--	na	3.4E+01
Aldrin ^c	0	3.0E+00	--	na	5.0E-04	3.1E+01	--	na	6.8E-02	7.5E-01	--	na	5.0E-05	3.5E+01	--	na	6.8E-03	3.1E+01	--	na	6.8E-03
Ammonia-N (mg/l) (Yearly)	0.1	6.83E+00	1.17E+00	na	--	6.96E+01	5.93E+01	na	--	1.81E+00	3.68E-01	na	--	7.99E+01	1.49E+01	na	--	6.96E+01	1.49E+01	na	--
Ammonia-N (mg/l) (High Flow)	0.1	6.86E+00	2.09E+00	na	--	8.84E+01	1.42E+02	na	--	1.81E+00	5.98E-01	na	--	1.03E+02	3.55E+01	na	--	8.84E+01	3.55E+01	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	2.4E+06	--	--	na	4.0E+03	--	--	na	2.4E+05	--	--	na	2.4E+05
Antimony	0	--	--	na	6.4E+02	--	--	na	3.9E+04	--	--	na	6.4E+01	--	--	na	3.9E+03	--	--	na	3.9E+03
Arsenic	3.4E+02	1.5E+02	na	--	3.5E+03	7.6E+03	na	--	8.5E+01	3.8E+01	na	--	4.0E+03	1.9E+03	na	--	3.5E+03	1.9E+03	na	--	
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	na	--	
Benzene ^c	0	--	--	na	5.1E+02	--	--	na	7.0E+04	--	--	na	5.1E+01	--	--	na	7.0E+03	--	--	na	7.0E+03
Benzidine ^c	0	--	--	na	2.0E-03	--	--	na	2.7E-01	--	--	na	2.0E-04	--	--	na	2.7E-02	--	--	na	2.7E-02
Benzo (a) anthracene ^c	0	--	--	na	1.8E-01	--	--	na	2.5E+01	--	--	na	1.8E-02	--	--	na	2.5E+00	--	--	na	2.5E+00
Benzo (b) fluoranthene ^c	0	--	--	na	1.8E-01	--	--	na	2.5E+01	--	--	na	1.8E-02	--	--	na	2.5E+00	--	--	na	2.5E+00
Benzo (k) fluoranthene ^c	0	--	--	na	1.8E-01	--	--	na	2.5E+01	--	--	na	1.8E-02	--	--	na	2.5E+00	--	--	na	2.5E+00
Benzo (a) pyrene ^c	0	--	--	na	1.8E-01	--	--	na	2.5E+01	--	--	na	1.8E-02	--	--	na	2.5E+00	--	--	na	2.5E+00
Bis2-Chloroethyl Ether ^c	0	--	--	na	5.3E+00	--	--	na	7.2E+02	--	--	na	5.3E-01	--	--	na	7.2E+01	--	--	na	7.2E+01
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	4.0E+06	--	--	na	6.5E+03	--	--	na	4.0E+05	--	--	na	4.0E+05
Bis 2-Ethylhexyl Phthalate ^c	0	--	--	na	2.2E+01	--	--	na	3.0E+03	--	--	na	2.2E+00	--	--	na	3.0E+02	--	--	na	3.0E+02
Bromoform ^c	0	--	--	na	1.4E+03	--	--	na	1.9E+05	--	--	na	1.4E+02	--	--	na	1.9E+04	--	--	na	1.9E+04
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	1.2E+05	--	--	na	1.9E+02	--	--	na	1.2E+04	--	--	na	1.2E+04
Cadmium	0	5.7E+00	1.5E+00	na	--	5.8E+01	7.4E+01	na	--	1.4E+00	3.7E-01	na	--	6.6E+01	1.9E+01	na	--	5.8E+01	1.9E+01	na	--
Carbon Tetrachloride ^c	0	--	--	na	1.6E+01	--	--	na	2.2E+03	--	--	na	1.6E+00	--	--	na	2.2E+02	--	--	na	2.2E+02
Chlordane ^c	0	2.4E+00	4.3E-03	na	8.1E-03	2.5E+01	2.2E-01	na	1.1E+00	6.0E-01	1.1E-03	na	8.1E-04	2.8E+01	5.4E-02	na	1.1E-01	2.5E+01	5.4E-02	na	1.1E-01
Chloride	0	8.6E+05	2.3E+05	na	--	8.9E+06	1.2E+07	na	--	2.2E+05	5.8E+04	na	--	1.0E+07	2.9E+06	na	--	8.9E+06	2.9E+06	na	--
TRC	0	1.9E+01	1.1E+01	na	--	2.0E+02	5.6E+02	na	--	4.8E+00	2.8E+00	na	--	2.2E+02	1.4E+02	na	--	2.0E+02	1.4E+02	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	9.8E+04	--	--	na	1.6E+02	--	--	na	9.8E+03	--	--	na	9.8E+03

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations				
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	
Chlorodibromomethane ^c	0	--	--	na	1.3E+02	--	--	na	1.8E+04	--	--	na	1.3E+01	--	--	na	1.8E+03	--	--	na	1.8E+03	
Chloroform	0	--	--	na	1.1E+04	--	--	na	6.7E+05	--	--	na	1.1E+03	--	--	na	6.7E+04	--	--	na	6.7E+04	
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	9.8E+04	--	--	na	1.6E+02	--	--	na	9.8E+03	--	--	na	9.8E+03	
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	9.2E+03	--	--	na	1.5E+01	--	--	na	9.2E+02	--	--	na	9.2E+02	
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.6E-01	2.1E+00	na	--	2.1E-02	1.0E-02	na	--	9.7E-01	5.2E-01	na	--	8.6E-01	5.2E-01	na	--	
Chromium III	0	7.4E+02	9.7E+01	na	--	7.7E+03	4.9E+03	na	--	1.9E+02	2.4E+01	na	--	8.7E+03	1.2E+03	na	--	7.7E+03	1.2E+03	na	--	
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.7E+02	5.6E+02	na	--	4.0E+00	2.8E+00	na	--	1.9E+02	1.4E+02	na	--	1.7E+02	1.4E+02	na	--	
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	--	6.1E+02	--	--	na	--	
Chrysene ^c	0	--	--	na	1.8E-02	--	--	na	2.5E+00	--	--	na	1.8E-03	--	--	na	2.5E-01	--	--	na	2.5E-01	
Copper	0	1.8E+01	1.2E+01	na	--	1.9E+02	6.0E+02	na	--	4.6E+00	3.0E+00	na	--	2.1E+02	1.5E+02	na	--	1.9E+02	1.5E+02	na	--	
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.3E+02	2.6E+02	na	9.8E+05	5.5E+00	1.3E+00	na	1.6E+03	2.6E+02	6.6E+01	na	9.8E+04	2.3E+02	6.6E+01	na	9.8E+04	
DDD ^c	0	--	--	na	3.1E-03	--	--	na	4.2E-01	--	--	na	3.1E-04	--	--	na	4.2E-02	--	--	na	4.2E-02	
DDE ^c	0	--	--	na	2.2E-03	--	--	na	3.0E-01	--	--	na	2.2E-04	--	--	na	3.0E-02	--	--	na	3.0E-02	
DDT ^c	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+01	5.1E-02	na	3.0E-01	2.8E-01	2.5E-04	na	2.2E-04	1.3E+01	1.3E-02	na	3.0E-02	1.1E+01	1.3E-02	na	3.0E-02	
Demeton	0	--	--	1.0E-01	na	--	--	5.1E+00	na	--	--	2.5E-02	na	--	--	1.3E+00	na	--	--	1.3E+00	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.8E+00	8.6E+00	na	--	4.3E-02	4.3E-02	na	--	2.0E+00	2.2E+00	na	--	1.8E+00	2.2E+00	na	--	
Dibenz(a,h)anthracene ^c	0	--	--	na	1.8E-01	--	--	na	2.5E+01	--	--	na	1.8E-02	--	--	na	2.5E+00	--	--	na	2.5E+00	
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	7.9E+04	--	--	na	1.3E+02	--	--	na	7.9E+03	--	--	na	7.9E+03	
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	5.9E+04	--	--	na	9.6E+01	--	--	na	5.9E+03	--	--	na	5.9E+03	
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	1.2E+04	--	--	na	1.9E+01	--	--	na	1.2E+03	--	--	na	1.2E+03	
3,3-Dichlorobenzidine ^c	0	--	--	na	2.8E-01	--	--	na	3.8E+01	--	--	na	2.8E-02	--	--	na	3.8E+00	--	--	na	3.8E+00	
Dichlorobromomethane ^c	0	--	--	na	1.7E+02	--	--	na	2.3E+04	--	--	na	1.7E+01	--	--	na	2.3E+03	--	--	na	2.3E+03	
1,2-Dichloroethane ^c	0	--	--	na	3.7E+02	--	--	na	5.1E+04	--	--	na	3.7E+01	--	--	na	5.1E+03	--	--	na	5.1E+03	
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	4.3E+05	--	--	na	7.1E+02	--	--	na	4.3E+04	--	--	na	4.3E+04	
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	6.1E+05	--	--	na	1.0E+03	--	--	na	6.1E+04	--	--	na	6.1E+04	
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	1.8E+04	--	--	na	2.9E+01	--	--	na	1.8E+03	--	--	na	1.8E+03	
2,4-Dichlorophenoxyacetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	
1,2-Dichloropropane ^c	0	--	--	na	1.5E+02	--	--	na	2.1E+04	--	--	na	1.5E+01	--	--	na	2.1E+03	--	--	na	2.1E+03	
1,3-Dichloropropene ^c	0	--	--	na	2.1E+02	--	--	na	2.9E+04	--	--	na	2.1E+01	--	--	na	2.9E+03	--	--	na	2.9E+03	
Dieldrin ^c	0	2.4E-01	5.6E-02	na	5.4E-04	2.5E+00	2.8E+00	na	7.4E-02	6.0E-02	1.4E-02	na	5.4E-05	2.8E+00	7.1E-01	na	7.4E-03	2.5E+00	7.1E-01	na	7.4E-03	
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	2.7E+06	--	--	na	4.4E+03	--	--	na	2.7E+05	--	--	na	2.7E+05	
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	5.2E+04	--	--	na	8.5E+01	--	--	na	5.2E+03	--	--	na	5.2E+03	
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	6.7E+07	--	--	na	1.1E+05	--	--	na	6.7E+06	--	--	na	6.7E+06	
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	2.7E+05	--	--	na	4.5E+02	--	--	na	2.7E+04	--	--	na	2.7E+04	
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	3.2E+05	--	--	na	5.3E+02	--	--	na	3.2E+04	--	--	na	3.2E+04	
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	1.7E+04	--	--	na	2.8E+01	--	--	na	1.7E+03	--	--	na	1.7E+03	
2,4-Dinitrotoluene ^c	0	--	--	na	3.4E+01	--	--	na	4.7E+03	--	--	na	3.4E+00	--	--	na	4.7E+02	--	--	na	4.7E+02	
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	3.1E-06	--	--	na	5.1E-09	--	--	na	3.1E-07	--	--	na	3.1E-07	
1,2-Diphenylhydrazine ^c	0	--	--	na	2.0E+00	--	--	na	2.7E+02	--	--	na	2.0E-01	--	--	na	2.7E+01	--	--	na	2.7E+01	
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.3E+00	2.8E+00	na	5.4E+03	5.5E-02	1.4E-02	na	8.9E+00	2.6E+00	7.1E-01	na	5.4E+02	2.3E+00	7.1E-01	na	5.4E+02	
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.3E+00	2.8E+00	na	5.4E+03	5.5E-02	1.4E-02	na	8.9E+00	2.6E+00	7.1E-01	na	5.4E+02	2.3E+00	7.1E-01	na	5.4E+02	
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.3E+00	2.8E+00	--	--	5.5E-02	1.4E-02	--	--	2.6E+00	7.1E-01	--	--	2.3E+00	7.1E-01	--	--	
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	5.4E+03	--	--	na	8.9E+00	--	--	na	5.4E+02	--	--	na	5.4E+02	
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.9E-01	1.8E+00	na	3.7E+00	2.2E-02	9.0E-03	na	6.0E-03	1.0E+00	4.6E-01	na	3.7E-01	8.9E-01	4.6E-01	na	3.7E-01	
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	1.8E+01	--	--	na	3.0E-02	--	--	na	1.8E+00	--	--	na	1.8E+00	

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	1.3E+05	--	--	na	2.1E+02	--	--	na	1.3E+04	--	--	na	1.3E+04
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	8.5E+03	--	--	na	1.4E+01	--	--	na	8.5E+02	--	--	na	8.5E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	3.2E+05	--	--	na	5.3E+02	--	--	na	3.2E+04	--	--	na	3.2E+04
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	5.1E-01	na	--	--	2.5E-03	na	--	--	1.3E-01	na	--	--	1.3E-01	na	--
Heptachlor C	0	5.2E-01	3.8E-03	na	7.9E-04	5.4E+00	1.9E-01	na	1.1E-01	1.3E-01	9.5E-04	na	7.9E-05	6.1E+00	4.8E-02	na	1.1E-02	5.4E+00	4.8E-02	na	1.1E-02
Heptachlor Epoxide C	0	5.2E-01	3.8E-03	na	3.9E-04	5.4E+00	1.9E-01	na	5.3E-02	1.3E-01	9.5E-04	na	3.9E-05	6.1E+00	4.8E-02	na	5.3E-03	5.4E+00	4.8E-02	na	5.3E-03
Hexachlorobenzene C	0	--	--	na	2.9E-03	--	--	na	4.0E-01	--	--	na	2.9E-04	--	--	na	4.0E-02	--	--	na	4.0E-02
Hexachlorobutadiene C	0	--	--	na	1.8E+02	--	--	na	2.5E+04	--	--	na	1.8E+01	--	--	na	2.5E+03	--	--	na	2.5E+03
Hexachlorocyclohexane																					
Alpha-BHC C	0	--	--	na	4.9E-02	--	--	na	6.7E+00	--	--	na	4.9E-03	--	--	na	6.7E-01	--	--	na	6.7E-01
Hexachlorocyclohexane																					
Beta-BHC C	0	--	--	na	1.7E-01	--	--	na	2.3E+01	--	--	na	1.7E-02	--	--	na	2.3E+00	--	--	na	2.3E+00
Hexachlorocyclohexane																					
Gamma-BHC C (Lindane)	0	9.5E-01	na	na	1.8E+00	9.8E+00	--	na	2.5E+02	2.4E-01	--	na	1.8E-01	1.1E+01	--	na	2.5E+01	9.8E+00	--	na	2.5E+01
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	6.7E+04	--	--	na	1.1E+02	--	--	na	6.7E+03	--	--	na	6.7E+03
Hexachloroethane C	0	--	--	na	3.3E+01	--	--	na	4.5E+03	--	--	na	3.3E+00	--	--	na	4.5E+02	--	--	na	4.5E+02
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	1.0E+02	na	--	--	5.0E-01	na	--	--	2.5E+01	na	--	--	2.5E+01	na	--
Indeno (1,2,3-cd) pyrene C	0	--	--	na	1.8E-01	--	--	na	2.5E+01	--	--	na	1.8E-02	--	--	na	2.5E+00	--	--	na	2.5E+00
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone C	0	--	--	na	9.6E+03	--	--	na	1.3E+06	--	--	na	9.6E+02	--	--	na	1.3E+05	--	--	na	1.3E+05
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Lead	0	1.8E+02	2.1E+01	na	--	1.9E+03	1.0E+03	na	--	4.5E+01	5.1E+00	na	--	2.1E+03	2.6E+02	na	--	1.9E+03	2.6E+02	na	--
Malathion	0	--	1.0E-01	na	--	--	5.1E+00	na	--	--	2.5E-02	na	--	--	1.3E+00	na	--	--	1.3E+00	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.4E+01	3.9E+01	--	--	3.5E-01	1.9E-01	--	--	1.6E+01	9.7E+00	--	--	1.4E+01	9.7E+00	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	9.2E+04	--	--	na	1.5E+02	--	--	na	9.2E+03	--	--	na	9.2E+03
Methylene Chloride C	0	--	--	na	5.9E+03	--	--	na	8.1E+05	--	--	na	5.9E+02	--	--	na	8.1E+04	--	--	na	8.1E+04
Methoxychlor	0	--	3.0E-02	na	--	--	1.5E+00	na	--	--	7.5E-03	na	--	--	3.8E-01	na	--	--	3.8E-01	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Nickel	0	2.4E+02	2.7E+01	na	4.6E+03	2.5E+03	1.4E+03	na	2.8E+05	6.0E+01	6.7E+00	na	4.6E+02	2.8E+03	3.4E+02	na	2.8E+04	2.5E+03	3.4E+02	na	2.8E+04
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	4.2E+04	--	--	na	6.9E+01	--	--	na	4.2E+03	--	--	na	4.2E+03
N-Nitrosodimethylamine C	0	--	--	na	3.0E+01	--	--	na	4.1E+03	--	--	na	3.0E+00	--	--	na	4.1E+02	--	--	na	4.1E+02
N-Nitrosodiphenylamine C	0	--	--	na	6.0E+01	--	--	na	8.2E+03	--	--	na	6.0E+00	--	--	na	8.2E+02	--	--	na	8.2E+02
N-Nitrosodi-n-propylamine C	0	--	--	na	5.1E+00	--	--	na	7.0E+02	--	--	na	5.1E-01	--	--	na	7.0E+01	--	--	na	7.0E+01
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.9E+02	3.3E+02	na	--	7.0E+00	1.7E+00	--	--	3.3E+02	8.4E+01	--	--	2.9E+02	8.4E+01	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.7E-01	6.6E-01	na	--	1.6E-02	3.3E-03	na	--	7.6E-01	1.6E-01	na	--	6.7E-01	1.6E-01	na	--
PCB Total C	0	--	1.4E-02	na	6.4E-04	--	7.1E-01	na	8.8E-02	--	3.5E-03	na	6.4E-05	--	1.8E-01	na	8.8E-03	--	1.8E-01	na	8.8E-03
Pentachlorophenol C	0	5.4E+00	4.1E+00	na	3.0E+01	5.6E+01	2.1E+02	na	4.1E+03	1.3E+00	1.0E+00	na	3.0E+00	6.2E+01	5.2E+01	na	4.1E+02	5.6E+01	5.2E+01	na	4.1E+02
Phenol	0	--	--	na	8.6E+05	--	--	na	5.2E+07	--	--	na	8.6E+04	--	--	na	5.2E+06	--	--	na	5.2E+06
Pyrene	0	--	--	na	4.0E+03	--	--	na	2.4E+05	--	--	na	4.0E+02	--	--	na	2.4E+04	--	--	na	2.4E+04
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.1E+02	2.5E+02	na	2.6E+05	5.0E+00	1.3E+00	na	4.2E+02	2.3E+02	6.3E+01	na	2.6E+04	2.1E+02	6.3E+01	na	2.6E+04
Silver	0	6.0E+00	--	na	--	6.2E+01	--	na	--	1.5E+00	--	na	--	7.1E+01	--	na	--	6.2E+01	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	--	--	--	--	na	--
1,1,2,2-Tetrachloroethane ^C	0	--	--	na	4.0E+01	--	--	na	5.5E+03	--	--	na	4.0E+00	--	--	na	5.5E+02	--	--	na	5.5E+02
Tetrachloroethylene ^C	0	--	--	na	3.3E+01	--	--	na	4.5E+03	--	--	na	3.3E+00	--	--	na	4.5E+02	--	--	na	4.5E+02
Thallium	0	--	--	na	4.7E-01	--	--	na	2.9E+01	--	--	na	4.7E-02	--	--	na	2.9E+00	--	--	na	2.9E+00
Toluene	0	--	--	na	6.0E+03	--	--	na	3.7E+05	--	--	na	6.0E+02	--	--	na	3.7E+04	--	--	na	3.7E+04
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Toxaphene ^C	0	7.3E-01	2.0E-04	na	2.8E-03	7.5E+00	1.0E-02	na	3.8E-01	1.8E-01	5.0E-05	na	2.8E-04	8.5E+00	2.5E-03	na	3.8E-02	7.5E+00	2.5E-03	na	3.8E-02
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.7E+00	3.6E+00	na	--	1.2E-01	1.8E-02	na	--	5.4E+00	9.1E-01	na	--	4.7E+00	9.1E-01	na	--
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	4.3E+03	--	--	na	7.0E+00	--	--	na	4.3E+02	--	--	na	4.3E+02
1,1,2-Trichloroethane ^C	0	--	--	na	1.6E+02	--	--	na	2.2E+04	--	--	na	1.6E+01	--	--	na	2.2E+03	--	--	na	2.2E+03
Trichloroethylene ^C	0	--	--	na	3.0E+02	--	--	na	4.1E+04	--	--	na	3.0E+01	--	--	na	4.1E+03	--	--	na	4.1E+03
2,4,6-Trichlorophenol ^C	0	--	--	na	2.4E+01	--	--	na	3.3E+03	--	--	na	2.4E+00	--	--	na	3.3E+02	--	--	na	3.3E+02
2-(2,4,5-Trichlorophenoxy)propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Vinyl Chloride ^C	0	--	--	na	2.4E+01	--	--	na	3.3E+03	--	--	na	2.4E+00	--	--	na	3.3E+02	--	--	na	3.3E+02
Zinc	0	1.5E+02	1.6E+02	na	2.6E+04	1.6E+03	7.9E+03	na	1.6E+06	3.9E+01	3.9E+01	na	2.6E+03	1.8E+03	2.0E+03	na	1.6E+05	1.6E+03	2.0E+03	na	1.6E+05

Notes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
- Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipal
- Metals measured as Dissolved, unless specified otherwise
- "C" indicates a carcinogenic parameter
- Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
Antidegradation WLAs are based upon a complete mix.
- Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
= (0.1(WQC - background conc.) + background conc.) for human health
- WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	3.9E+03
Arsenic	1.1E+03
Barium	na
Cadmium	1.1E+01
Chromium III	7.4E+02
Chromium VI	6.6E+01
Copper	7.5E+01
Iron	na
Lead	1.6E+02
Manganese	na
Mercury	5.8E+00
Nickel	2.0E+02
Selenium	3.8E+01
Silver	2.5E+01
Zinc	6.4E+02

Note: do not use QL's lower than the minimum QL's provided in agency guidance

2.600 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGD) 2.600				Ammonia - Dry Season - Acute	Ammonia - Dry Season - Chronic																												
Stream Flows <u>Allocated to Mix (MGD)</u> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Dry Season</th> <th>Wet Season</th> <th>Dry Season</th> <th>Wet Season</th> </tr> </thead> <tbody> <tr> <td>24.240</td> <td>31.370</td> <td>26.840</td> <td>33.970</td> </tr> <tr> <td>129.000</td> <td>N/A</td> <td>131.600</td> <td>N/A</td> </tr> <tr> <td>141.000</td> <td>182.000</td> <td>143.600</td> <td>184.600</td> </tr> <tr> <td>156.000</td> <td>N/A</td> <td>158.600</td> <td>N/A</td> </tr> <tr> <td>353.000</td> <td>N/A</td> <td>355.600</td> <td>N/A</td> </tr> <tr> <td>0.000</td> <td>N/A</td> <td>2.600</td> <td>N/A</td> </tr> </tbody> </table>				Dry Season	Wet Season	Dry Season	Wet Season	24.240	31.370	26.840	33.970	129.000	N/A	131.600	N/A	141.000	182.000	143.600	184.600	156.000	N/A	158.600	N/A	353.000	N/A	355.600	N/A	0.000	N/A	2.600	N/A	90th Percentile pH (SU) 8.109 (7.204 - pH) -0.905 (pH - 7.204) 0.905	
Dry Season	Wet Season	Dry Season	Wet Season																														
24.240	31.370	26.840	33.970																														
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Total Mix Flows <u>Stream + Discharge (MGD)</u> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Dry Season</th> <th>Wet Season</th> <th>Dry Season</th> <th>Wet Season</th> </tr> </thead> <tbody> <tr> <td>23.587</td> <td>14.874</td> <td></td> <td></td> </tr> <tr> <td>23.516</td> <td>14.324</td> <td></td> <td></td> </tr> <tr> <td>8.109</td> <td>8.107</td> <td></td> <td></td> </tr> <tr> <td>8.102</td> <td>8.101</td> <td></td> <td></td> </tr> <tr> <td>6.530</td> <td>N/A</td> <td></td> <td></td> </tr> <tr> <td>6.506</td> <td>N/A</td> <td></td> <td></td> </tr> </tbody> </table>				Dry Season	Wet Season	Dry Season	Wet Season	23.587	14.874			23.516	14.324			8.109	8.107			8.102	8.101			6.530	N/A			6.506	N/A			90th Percentile Temp. (deg C) 23.516 90th Percentile pH (SU) 8.102 MIN 1.596 MAX 23.516 (7.688 - pH) -0.414 (pH - 7.688) 0.414	
Dry Season	Wet Season	Dry Season	Wet Season																														
23.587	14.874																																
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Dry Season	Wet Season																																
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2.600 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGD) 2.600				Ammonia - Dry Season - Acute	Ammonia - Dry Season - Chronic																												
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Facility = Lower Jackson River Regional
Chemical = Ammonia for 2.6 MGD
Chronic averaging period = 30
WLAA = 69.6
WLAC = 14.9
Q.L. = 0.2
samples/mo. = 4
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Lower Jackson River Regional WWTP 3.5 MGD

Permit No.: VA0090671

Receiving Stream: Jackson River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO ₃) =	139 mg/L	1Q10 (Annual) =	119 MGD	Annual - 1Q10 Mix =	20.37 %	Mean Hardness (as CaCO ₃) =	131 mg/L
90% Temperature (Annual) =	23.5 deg C	7Q10 (Annual) =	129 MGD	- 7Q10 Mix =	100 %	90% Temp (Annual) =	24.4 deg C
90% Temperature (Wet season) =	14.2 deg C	30Q10 (Annual) =	141 MGD	- 30Q10 Mix =	100 %	90% Temp (Wet season) =	23 deg C
90% Maximum pH =	8 SU	1Q10 (Wet season) =	154 MGD	Wet Season - 1Q10 Mix =	20.37 %	90% Maximum pH =	7.9 SU
10% Maximum pH =	6.5 SU	30Q10 (Wet season) =	182 MGD	- 30Q10 Mix =	100 %	10% Maximum pH =	7 SU
Tier Designation (1 or 2) =	2	30Q5 =	156 MGD			Discharge Flow =	3.5 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	353 MGD				
Trout Present Y/N? =	n						
Early Life Stages Present Y/N? =	y						

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenaphthene	0	--	--	na	9.9E+02	--	--	na	4.5E+04	--	--	na	9.9E+01	--	--	na	4.5E+03	--	--	na	4.5E+03
Acrolein	0	--	--	na	9.3E+00	--	--	na	4.2E+02	--	--	na	9.3E-01	--	--	na	4.2E+01	--	--	na	4.2E+01
Acrylonitrile ^c	0	--	--	na	2.5E+00	--	--	na	2.5E+02	--	--	na	2.5E-01	--	--	na	2.5E+01	--	--	na	2.5E+01
Aldrin ^c	0	3.0E+00	--	na	5.0E-04	2.4E+01	--	na	5.1E-02	7.5E-01	--	na	5.0E-05	2.6E+01	--	na	5.1E-03	2.4E+01	--	na	5.1E-03
Ammonia-N (mg/l) (Yearly)	0.1	8.63E+00	1.37E+00	na	--	6.77E+01	5.24E+01	na	--	2.19E+00	4.17E-01	na	--	7.32E+01	1.32E+01	na	--	6.77E+01	1.32E+01	na	--
Ammonia-N (mg/l) (High Flow)	0.1	8.59E+00	2.44E+00	na	--	8.46E+01	1.24E+02	na	--	2.19E+00	6.85E-01	na	--	9.40E+01	3.11E+01	na	--	8.46E+01	3.11E+01	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	1.8E+06	--	--	na	4.0E+03	--	--	na	1.8E+05	--	--	na	1.8E+05
Antimony	0	--	--	na	6.4E+02	--	--	na	2.9E+04	--	--	na	6.4E+01	--	--	na	2.9E+03	--	--	na	2.9E+03
Arsenic	3.4E+02	1.5E+02	na	--	2.7E+03	5.7E+03	na	--	8.5E+01	3.8E+01	na	--	3.0E+03	1.4E+03	na	--	2.7E+03	1.4E+03	na	--	
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	na	--	--
Benzene ^c	0	--	--	na	5.1E+02	--	--	na	5.2E+04	--	--	na	5.1E+01	--	--	na	5.2E+03	--	--	na	5.2E+03
Benzidine ^c	0	--	--	na	2.0E-03	--	--	na	2.0E-01	--	--	na	2.0E-04	--	--	na	2.0E-02	--	--	na	2.0E-02
Benzo (a) anthracene ^c	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00
Benzo (b) fluoranthene ^c	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00
Benzo (k) fluoranthene ^c	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00
Benzo (a) pyrene ^c	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00
Bis2-Chloroethyl Ether ^c	0	--	--	na	5.3E+00	--	--	na	5.4E+02	--	--	na	5.3E-01	--	--	na	5.4E+01	--	--	na	5.4E+01
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	3.0E+06	--	--	na	6.5E+03	--	--	na	3.0E+05	--	--	na	3.0E+05
Bis 2-Ethylhexyl Phthalate ^c	0	--	--	na	2.2E+01	--	--	na	2.2E+03	--	--	na	2.2E+00	--	--	na	2.2E+02	--	--	na	2.2E+02
Bromoform ^c	0	--	--	na	1.4E+03	--	--	na	1.4E+05	--	--	na	1.4E+02	--	--	na	1.4E+04	--	--	na	1.4E+04
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	8.7E+04	--	--	na	1.9E+02	--	--	na	8.7E+03	--	--	na	8.7E+03
Cadmium	0	5.6E+00	1.5E+00	na	--	4.5E+01	5.6E+01	na	--	1.4E+00	3.7E-01	na	--	5.0E+01	1.4E+01	na	--	4.5E+01	1.4E+01	na	--
Carbon Tetrachloride ^c	0	--	--	na	1.6E+01	--	--	na	1.6E+03	--	--	na	1.6E+00	--	--	na	1.6E+02	--	--	na	1.6E+02
Chlordane ^c	0	2.4E+00	4.3E-03	na	8.1E-03	1.9E+01	1.6E-01	na	8.3E-01	6.0E-01	1.1E-03	na	8.1E-04	2.1E+01	4.1E-02	na	8.3E-02	1.9E+01	4.1E-02	na	8.3E-02
Chloride	0	8.6E+05	2.3E+05	na	--	6.8E+06	8.7E+06	na	--	2.2E+05	5.8E+04	na	--	7.5E+06	2.2E+06	na	--	6.8E+06	2.2E+06	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.5E+02	4.2E+02	na	--	4.8E+00	2.8E+00	na	--	1.7E+02	1.0E+02	na	--	1.5E+02	1.0E+02	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	7.3E+04	--	--	na	1.6E+02	--	--	na	7.3E+03	--	--	na	7.3E+03

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations				
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	
Chlorodibromomethane ^c	0	--	--	na	1.3E+02	--	--	na	1.3E+04	--	--	na	1.3E+01	--	--	na	1.3E+03	--	--	na	1.3E+03	
Chloroform	0	--	--	na	1.1E+04	--	--	na	5.0E+05	--	--	na	1.1E+03	--	--	na	5.0E+04	--	--	na	5.0E+04	
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	7.3E+04	--	--	na	1.6E+02	--	--	na	7.3E+03	--	--	na	7.3E+03	
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	6.8E+03	--	--	na	1.5E+01	--	--	na	6.8E+02	--	--	na	6.8E+02	
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	6.6E-01	1.6E+00	na	--	2.1E-02	1.0E-02	na	--	7.3E-01	3.9E-01	na	--	6.6E-01	3.9E-01	na	--	
Chromium III	0	7.4E+02	9.7E+01	na	--	5.9E+03	3.7E+03	na	--	1.9E+02	2.4E+01	na	--	6.5E+03	9.2E+02	na	--	5.9E+03	9.2E+02	na	--	
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.3E+02	4.2E+02	na	--	4.0E+00	2.8E+00	na	--	1.4E+02	1.0E+02	na	--	1.3E+02	1.0E+02	na	--	
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	4.6E+02	--	--	--	na	--	
Chrysene ^c	0	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E-03	--	--	na	1.8E-01	--	--	na	1.8E-01	
Copper	0	1.8E+01	1.2E+01	na	--	1.4E+02	4.5E+02	na	--	4.6E+00	3.0E+00	na	--	1.6E+02	1.1E+02	na	--	1.4E+02	1.1E+02	na	--	
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	1.7E+02	2.0E+02	na	7.3E+05	5.5E+00	1.3E+00	na	1.6E+03	1.9E+02	4.9E+01	na	7.3E+04	1.7E+02	4.9E+01	na	7.3E+04	
DDD ^c	0	--	--	na	3.1E-03	--	--	na	3.2E-01	--	--	na	3.1E-04	--	--	na	3.2E-02	--	--	na	3.2E-02	
DDE ^c	0	--	--	na	2.2E-03	--	--	na	2.2E-01	--	--	na	2.2E-04	--	--	na	2.2E-02	--	--	na	2.2E-02	
DDT ^c	0	1.1E+00	1.0E-03	na	2.2E-03	8.7E+00	3.8E-02	na	2.2E-01	2.8E-01	2.5E-04	na	2.2E-04	9.6E+00	9.5E-03	na	2.2E-02	8.7E+00	9.5E-03	na	2.2E-02	
Demeton	0	--	--	1.0E-01	na	--	--	3.8E+00	na	--	--	2.5E-02	na	--	--	9.5E-01	na	--	--	9.5E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.3E+00	6.4E+00	na	--	4.3E-02	4.3E-02	na	--	1.5E+00	1.6E+00	na	--	1.3E+00	1.6E+00	na	--	
Dibenz(a,h)anthracene ^c	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00	
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	5.9E+04	--	--	na	1.3E+02	--	--	na	5.9E+03	--	--	na	5.9E+03	
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	4.4E+04	--	--	na	9.6E+01	--	--	na	4.4E+03	--	--	na	4.4E+03	
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	8.7E+03	--	--	na	1.9E+01	--	--	na	8.7E+02	--	--	na	8.7E+02	
3,3-Dichlorobenzidine ^c	0	--	--	na	2.8E-01	--	--	na	2.9E+01	--	--	na	2.8E-02	--	--	na	2.9E+00	--	--	na	2.9E+00	
Dichlorobromomethane ^c	0	--	--	na	1.7E+02	--	--	na	1.7E+04	--	--	na	1.7E+01	--	--	na	1.7E+03	--	--	na	1.7E+03	
1,2-Dichloroethane ^c	0	--	--	na	3.7E+02	--	--	na	3.8E+04	--	--	na	3.7E+01	--	--	na	3.8E+03	--	--	na	3.8E+03	
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	3.2E+05	--	--	na	7.1E+02	--	--	na	3.2E+04	--	--	na	3.2E+04	
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	4.6E+05	--	--	na	1.0E+03	--	--	na	4.6E+04	--	--	na	4.6E+04	
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	1.3E+04	--	--	na	2.9E+01	--	--	na	1.3E+03	--	--	na	1.3E+03	
2,4-Dichlorophenoxyacetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	
1,2-Dichloropropane ^c	0	--	--	na	1.5E+02	--	--	na	1.5E+04	--	--	na	1.5E+01	--	--	na	1.5E+03	--	--	na	1.5E+03	
1,3-Dichloropropene ^c	0	--	--	na	2.1E+02	--	--	na	2.1E+04	--	--	na	2.1E+01	--	--	na	2.1E+03	--	--	na	2.1E+03	
Dieldrin ^c	0	2.4E-01	5.6E-02	na	5.4E-04	1.9E+00	2.1E+00	na	5.5E-02	6.0E-02	1.4E-02	na	5.4E-05	2.1E+00	5.3E-01	na	5.5E-03	1.9E+00	5.3E-01	na	5.5E-03	
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	2.0E+06	--	--	na	4.4E+03	--	--	na	2.0E+05	--	--	na	2.0E+05	
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	3.9E+04	--	--	na	8.5E+01	--	--	na	3.9E+03	--	--	na	3.9E+03	
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	5.0E+07	--	--	na	1.1E+05	--	--	na	5.0E+06	--	--	na	5.0E+06	
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	2.1E+05	--	--	na	4.5E+02	--	--	na	2.1E+04	--	--	na	2.1E+04	
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	2.4E+05	--	--	na	5.3E+02	--	--	na	2.4E+04	--	--	na	2.4E+04	
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	1.3E+04	--	--	na	2.8E+01	--	--	na	1.3E+03	--	--	na	1.3E+03	
2,4-Dinitrotoluene ^c	0	--	--	na	3.4E+01	--	--	na	3.5E+03	--	--	na	3.4E+00	--	--	na	3.5E+02	--	--	na	3.5E+02	
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	2.3E-06	--	--	na	5.1E-09	--	--	na	2.3E-07	--	--	na	2.3E-07	
1,2-Diphenylhydrazine ^c	0	--	--	na	2.0E+00	--	--	na	2.0E+02	--	--	na	2.0E-01	--	--	na	2.0E+01	--	--	na	2.0E+01	
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.7E+00	2.1E+00	na	4.1E+03	5.5E-02	1.4E-02	na	8.9E+00	1.9E+00	5.3E-01	na	4.1E+02	1.7E+00	5.3E-01	na	4.1E+02	
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.7E+00	2.1E+00	na	4.1E+03	5.5E-02	1.4E-02	na	8.9E+00	1.9E+00	5.3E-01	na	4.1E+02	1.7E+00	5.3E-01	na	4.1E+02	
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	1.7E+00	2.1E+00	--	--	5.5E-02	1.4E-02	--	--	1.9E+00	5.3E-01	--	--	1.7E+00	5.3E-01	--	--	
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	4.1E+03	--	--	na	8.9E+00	--	--	na	4.1E+02	--	--	na	4.1E+02	
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	6.8E-01	1.4E+00	na	2.7E+00	2.2E-02	9.0E-03	na	6.0E-03	7.5E-01	3.4E-01	na	2.7E-01	6.8E-01	3.4E-01	na	2.7E-01	
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	1.4E+01	--	--	na	3.0E-02	--	--	na	1.4E+00	--	--	na	1.4E+00	

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	9.6E+04	--	--	na	2.1E+02	--	--	na	9.6E+03	--	--	na	9.6E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	6.4E+03	--	--	na	1.4E+01	--	--	na	6.4E+02	--	--	na	6.4E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	2.4E+05	--	--	na	5.3E+02	--	--	na	2.4E+04	--	--	na	2.4E+04
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	3.8E-01	na	--	--	2.5E-03	na	--	--	9.5E-02	na	--	--	9.5E-02	na	--
Heptachlor C	0	5.2E-01	3.8E-03	na	7.9E-04	4.1E+00	1.4E-01	na	8.0E-02	1.3E-01	9.5E-04	na	7.9E-05	4.6E+00	3.6E-02	na	8.0E-03	4.1E+00	3.6E-02	na	8.0E-03
Heptachlor Epoxide C	0	5.2E-01	3.8E-03	na	3.9E-04	4.1E+00	1.4E-01	na	4.0E-02	1.3E-01	9.5E-04	na	3.9E-05	4.6E+00	3.6E-02	na	4.0E-03	4.1E+00	3.6E-02	na	4.0E-03
Hexachlorobenzene C	0	--	--	na	2.9E-03	--	--	na	3.0E-01	--	--	na	2.9E-04	--	--	na	3.0E-02	--	--	na	3.0E-02
Hexachlorobutadiene C	0	--	--	na	1.8E+02	--	--	na	1.8E+04	--	--	na	1.8E+01	--	--	na	1.8E+03	--	--	na	1.8E+03
Hexachlorocyclohexane																					
Alpha-BHC C	0	--	--	na	4.9E-02	--	--	na	5.0E+00	--	--	na	4.9E-03	--	--	na	5.0E-01	--	--	na	5.0E-01
Hexachlorocyclohexane																					
Beta-BHC C	0	--	--	na	1.7E-01	--	--	na	1.7E+01	--	--	na	1.7E-02	--	--	na	1.7E+00	--	--	na	1.7E+00
Hexachlorocyclohexane																					
Gamma-BHC C (Lindane)	0	9.5E-01	na	na	1.8E+00	7.5E+00	--	na	1.8E+02	2.4E-01	--	na	1.8E-01	8.3E+00	--	na	1.8E+01	7.5E+00	--	na	1.8E+01
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	5.0E+04	--	--	na	1.1E+02	--	--	na	5.0E+03	--	--	na	5.0E+03
Hexachloroethane C	0	--	--	na	3.3E+01	--	--	na	3.4E+03	--	--	na	3.3E+00	--	--	na	3.4E+02	--	--	na	3.4E+02
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	7.6E+01	na	--	--	5.0E-01	na	--	--	1.9E+01	na	--	--	1.9E+01	na	--
Indeno (1,2,3-cd) pyrene C	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone C	0	--	--	na	9.6E+03	--	--	na	9.8E+05	--	--	na	9.6E+02	--	--	na	9.8E+04	--	--	na	9.8E+04
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Lead	0	1.8E+02	2.1E+01	na	--	1.4E+03	7.8E+02	na	--	4.5E+01	5.1E+00	na	--	1.6E+03	1.9E+02	na	--	1.4E+03	1.9E+02	na	--
Malathion	0	--	1.0E-01	na	--	--	3.8E+00	na	--	--	2.5E-02	na	--	--	9.5E-01	na	--	--	9.5E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.1E+01	2.9E+01	--	--	3.5E-01	1.9E-01	--	--	1.2E+01	7.3E+00	--	--	1.1E+01	7.3E+00	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	6.8E+04	--	--	na	1.5E+02	--	--	na	6.8E+03	--	--	na	6.8E+03
Methylene Chloride C	0	--	--	na	5.9E+03	--	--	na	6.0E+05	--	--	na	5.9E+02	--	--	na	6.0E+04	--	--	na	6.0E+04
Methoxychlor	0	--	3.0E-02	na	--	--	1.1E+00	na	--	--	7.5E-03	na	--	--	2.8E-01	na	--	--	2.8E-01	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Nickel	0	2.4E+02	2.7E+01	na	4.6E+03	1.9E+03	1.0E+03	na	2.1E+05	6.0E+01	6.7E+00	na	4.6E+02	2.1E+03	2.5E+02	na	2.1E+04	1.9E+03	2.5E+02	na	2.1E+04
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	3.1E+04	--	--	na	6.9E+01	--	--	na	3.1E+03	--	--	na	3.1E+03
N-Nitrosodimethylamine C	0	--	--	na	3.0E+01	--	--	na	3.1E+03	--	--	na	3.0E+00	--	--	na	3.1E+02	--	--	na	3.1E+02
N-Nitrosodiphenylamine C	0	--	--	na	6.0E+01	--	--	na	6.1E+03	--	--	na	6.0E+00	--	--	na	6.1E+02	--	--	na	6.1E+02
N-Nitrosodi-n-propylamine C	0	--	--	na	5.1E+00	--	--	na	5.2E+02	--	--	na	5.1E-01	--	--	na	5.2E+01	--	--	na	5.2E+01
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.2E+02	2.5E+02	na	--	7.0E+00	1.7E+00	--	--	2.5E+02	6.2E+01	--	--	2.2E+02	6.2E+01	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	5.2E-01	4.9E-01	na	--	1.6E-02	3.3E-03	na	--	5.7E-01	1.2E-01	na	--	5.2E-01	1.2E-01	na	--
PCB Total C	0	--	1.4E-02	na	6.4E-04	--	5.3E-01	na	6.5E-02	--	3.5E-03	na	6.4E-05	--	1.3E-01	na	6.5E-03	--	1.3E-01	na	6.5E-03
Pentachlorophenol C	0	5.5E+00	4.1E+00	na	3.0E+01	4.4E+01	1.5E+02	na	3.1E+03	1.3E+00	1.0E+00	na	3.0E+00	4.7E+01	3.9E+01	na	3.1E+02	4.4E+01	3.9E+01	na	3.1E+02
Phenol	0	--	--	na	8.6E+05	--	--	na	3.9E+07	--	--	na	8.6E+04	--	--	na	3.9E+06	--	--	na	3.9E+06
Pyrene	0	--	--	na	4.0E+03	--	--	na	1.8E+05	--	--	na	4.0E+02	--	--	na	1.8E+04	--	--	na	1.8E+04
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	1.6E+02	1.9E+02	na	1.9E+05	5.0E+00	1.3E+00	na	4.2E+02	1.8E+02	4.7E+01	na	1.9E+04	1.6E+02	4.7E+01	na	1.9E+04
Silver	0	6.0E+00	--	na	--	4.8E+01	--	na	--	1.5E+00	--	na	--	5.3E+01	--	na	--	4.8E+01	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	--	--	--	--	na	--
1,1,2,2-Tetrachloroethane ^C	0	--	--	na	4.0E+01	--	--	na	4.1E+03	--	--	na	4.0E+00	--	--	na	4.1E+02	--	--	na	4.1E+02
Tetrachloroethylene ^C	0	--	--	na	3.3E+01	--	--	na	3.4E+03	--	--	na	3.3E+00	--	--	na	3.4E+02	--	--	na	3.4E+02
Thallium	0	--	--	na	4.7E-01	--	--	na	2.1E+01	--	--	na	4.7E-02	--	--	na	2.1E+00	--	--	na	2.1E+00
Toluene	0	--	--	na	6.0E+03	--	--	na	2.7E+05	--	--	na	6.0E+02	--	--	na	2.7E+04	--	--	na	2.7E+04
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Toxaphene ^C	0	7.3E-01	2.0E-04	na	2.8E-03	5.8E+00	7.6E-03	na	2.9E-01	1.8E-01	5.0E-05	na	2.8E-04	6.4E+00	1.9E-03	na	2.9E-02	5.8E+00	1.9E-03	na	2.9E-02
Tributyltin	0	4.6E-01	7.2E-02	na	--	3.6E+00	2.7E+00	na	--	1.2E-01	1.8E-02	na	--	4.0E+00	6.8E-01	na	--	3.6E+00	6.8E-01	na	--
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	3.2E+03	--	--	na	7.0E+00	--	--	na	3.2E+02	--	--	na	3.2E+02
1,1,2-Trichloroethane ^C	0	--	--	na	1.6E+02	--	--	na	1.6E+04	--	--	na	1.6E+01	--	--	na	1.6E+03	--	--	na	1.6E+03
Trichloroethylene ^C	0	--	--	na	3.0E+02	--	--	na	3.1E+04	--	--	na	3.0E+01	--	--	na	3.1E+03	--	--	na	3.1E+03
2,4,6-Trichlorophenol ^C	0	--	--	na	2.4E+01	--	--	na	2.4E+03	--	--	na	2.4E+00	--	--	na	2.4E+02	--	--	na	2.4E+02
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Vinyl Chloride ^C	0	--	--	na	2.4E+01	--	--	na	2.4E+03	--	--	na	2.4E+00	--	--	na	2.4E+02	--	--	na	2.4E+02
Zinc	0	1.5E+02	1.6E+02	na	2.6E+04	1.2E+03	5.9E+03	na	1.2E+06	3.9E+01	3.9E+01	na	2.6E+03	1.4E+03	1.5E+03	na	1.2E+05	1.2E+03	1.5E+03	na	1.2E+05

Notes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
- Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipal
- Metals measured as Dissolved, unless specified otherwise
- "C" indicates a carcinogenic parameter
- Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
Antidegradation WLAs are based upon a complete mix.
- Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
= (0.1(WQC - background conc.) + background conc.) for human health
- WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	2.9E+03
Arsenic	8.5E+02
Barium	na
Cadmium	8.3E+00
Chromium III	5.5E+02
Chromium VI	5.1E+01
Copper	5.8E+01
Iron	na
Lead	1.2E+02
Manganese	na
Mercury	4.4E+00
Nickel	1.5E+02
Selenium	2.8E+01
Silver	1.9E+01
Zinc	4.9E+02

Note: do not use QL's lower than the minimum QL's provided in agency guidance

3.500 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGD) 3.500				Ammonia - Dry Season - Acute	Ammonia - Dry Season - Chronic																																				
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FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Lower Jackson River Regional WWTP 3.5 MGD

Permit No.: VA0090671

Receiving Stream: Jackson River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO ₃) =	139 mg/L	1Q10 (Annual) =	119 MGD	Annual - 1Q10 Mix =	20.51 %	Mean Hardness (as CaCO ₃) =	131 mg/L
90% Temperature (Annual) =	23.5 deg C	7Q10 (Annual) =	129 MGD	- 7Q10 Mix =	100 %	90% Temp (Annual) =	24.4 deg C
90% Temperature (Wet season) =	14.2 deg C	30Q10 (Annual) =	141 MGD	- 30Q10 Mix =	100 %	90% Temp (Wet season) =	23 deg C
90% Maximum pH =	8 SU	1Q10 (Wet season) =	154 MGD	Wet Season - 1Q10 Mix =	20.51 %	90% Maximum pH =	7.9 SU
10% Maximum pH =	6.5 SU	30Q10 (Wet season) =	182 MGD	- 30Q10 Mix =	100 %	10% Maximum pH =	7 SU
Tier Designation (1 or 2) =	2	30Q5 =	156 MGD			Discharge Flow =	3.5 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	353 MGD				
Trout Present Y/N? =	n						
Early Life Stages Present Y/N? =	y						

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenaphthene	0	--	--	na	9.9E+02	--	--	na	4.5E+04	--	--	na	9.9E+01	--	--	na	4.5E+03	--	--	na	4.5E+03
Acrolein	0	--	--	na	9.3E+00	--	--	na	4.2E+02	--	--	na	9.3E-01	--	--	na	4.2E+01	--	--	na	4.2E+01
Acrylonitrile ^c	0	--	--	na	2.5E+00	--	--	na	2.5E+02	--	--	na	2.5E-01	--	--	na	2.5E+01	--	--	na	2.5E+01
Aldrin ^c	0	3.0E+00	--	na	5.0E-04	2.4E+01	--	na	5.1E-02	7.5E-01	--	na	5.0E-05	2.6E+01	--	na	5.1E-03	2.4E+01	--	na	5.1E-03
Ammonia-N (mg/l) (Yearly)	0.1	8.63E+00	1.37E+00	na	--	6.81E+01	5.24E+01	na	--	2.19E+00	4.17E-01	na	--	7.32E+01	1.32E+01	na	--	6.81E+01	1.32E+01	na	--
Ammonia-N (mg/l) (High Flow)	0.1	8.59E+00	2.44E+00	na	--	8.52E+01	1.24E+02	na	--	2.19E+00	6.85E-01	na	--	9.40E+01	3.11E+01	na	--	8.52E+01	3.11E+01	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	1.8E+06	--	--	na	4.0E+03	--	--	na	1.8E+05	--	--	na	1.8E+05
Antimony	0	--	--	na	6.4E+02	--	--	na	2.9E+04	--	--	na	6.4E+01	--	--	na	2.9E+03	--	--	na	2.9E+03
Arsenic	3.4E+02	1.5E+02	na	--	2.7E+03	5.7E+03	na	--	8.5E+01	3.8E+01	na	--	3.0E+03	1.4E+03	na	--	2.7E+03	1.4E+03	na	--	
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	na	--	--
Benzene ^c	0	--	--	na	5.1E+02	--	--	na	5.2E+04	--	--	na	5.1E+01	--	--	na	5.2E+03	--	--	na	5.2E+03
Benzidine ^c	0	--	--	na	2.0E-03	--	--	na	2.0E-01	--	--	na	2.0E-04	--	--	na	2.0E-02	--	--	na	2.0E-02
Benzo (a) anthracene ^c	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00
Benzo (b) fluoranthene ^c	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00
Benzo (k) fluoranthene ^c	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00
Benzo (a) pyrene ^c	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00
Bis2-Chloroethyl Ether ^c	0	--	--	na	5.3E+00	--	--	na	5.4E+02	--	--	na	5.3E-01	--	--	na	5.4E+01	--	--	na	5.4E+01
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	3.0E+06	--	--	na	6.5E+03	--	--	na	3.0E+05	--	--	na	3.0E+05
Bis 2-Ethylhexyl Phthalate ^c	0	--	--	na	2.2E+01	--	--	na	2.2E+03	--	--	na	2.2E+00	--	--	na	2.2E+02	--	--	na	2.2E+02
Bromoform ^c	0	--	--	na	1.4E+03	--	--	na	1.4E+05	--	--	na	1.4E+02	--	--	na	1.4E+04	--	--	na	1.4E+04
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	8.7E+04	--	--	na	1.9E+02	--	--	na	8.7E+03	--	--	na	8.7E+03
Cadmium	0	5.6E+00	1.5E+00	na	--	4.5E+01	5.6E+01	na	--	1.4E+00	3.7E-01	na	--	5.0E+01	1.4E+01	na	--	4.5E+01	1.4E+01	na	--
Carbon Tetrachloride ^c	0	--	--	na	1.6E+01	--	--	na	1.6E+03	--	--	na	1.6E+00	--	--	na	1.6E+02	--	--	na	1.6E+02
Chlordane ^c	0	2.4E+00	4.3E-03	na	8.1E-03	1.9E+01	1.6E-01	na	8.3E-01	6.0E-01	1.1E-03	na	8.1E-04	2.1E+01	4.1E-02	na	8.3E-02	1.9E+01	4.1E-02	na	8.3E-02
Chloride	0	8.6E+05	2.3E+05	na	--	6.9E+06	8.7E+06	na	--	2.2E+05	5.8E+04	na	--	7.5E+06	2.2E+06	na	--	6.9E+06	2.2E+06	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.5E+02	4.2E+02	na	--	4.8E+00	2.8E+00	na	--	1.7E+02	1.0E+02	na	--	1.5E+02	1.0E+02	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	7.3E+04	--	--	na	1.6E+02	--	--	na	7.3E+03	--	--	na	7.3E+03

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations				
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	
Chlorodibromomethane ^c	0	--	--	na	1.3E+02	--	--	na	1.3E+04	--	--	na	1.3E+01	--	--	na	1.3E+03	--	--	na	1.3E+03	
Chloroform	0	--	--	na	1.1E+04	--	--	na	5.0E+05	--	--	na	1.1E+03	--	--	na	5.0E+04	--	--	na	5.0E+04	
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	7.3E+04	--	--	na	1.6E+02	--	--	na	7.3E+03	--	--	na	7.3E+03	
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	6.8E+03	--	--	na	1.5E+01	--	--	na	6.8E+02	--	--	na	6.8E+02	
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	6.6E-01	1.6E+00	na	--	2.1E-02	1.0E-02	na	--	7.3E-01	3.9E-01	na	--	6.6E-01	3.9E-01	na	--	
Chromium III	0	7.4E+02	9.7E+01	na	--	5.9E+03	3.7E+03	na	--	1.9E+02	2.4E+01	na	--	6.5E+03	9.2E+02	na	--	5.9E+03	9.2E+02	na	--	
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.3E+02	4.2E+02	na	--	4.0E+00	2.8E+00	na	--	1.4E+02	1.0E+02	na	--	1.3E+02	1.0E+02	na	--	
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	4.6E+02	--	--	--	na	--	
Chrysene ^c	0	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E-03	--	--	na	1.8E-01	--	--	na	1.8E-01	
Copper	0	1.8E+01	1.2E+01	na	--	1.5E+02	4.5E+02	na	--	4.6E+00	3.0E+00	na	--	1.6E+02	1.1E+02	na	--	1.5E+02	1.1E+02	na	--	
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	1.8E+02	2.0E+02	na	7.3E+05	5.5E+00	1.3E+00	na	1.6E+03	1.9E+02	4.9E+01	na	7.3E+04	1.8E+02	4.9E+01	na	7.3E+04	
DDD ^c	0	--	--	na	3.1E-03	--	--	na	3.2E-01	--	--	na	3.1E-04	--	--	na	3.2E-02	--	--	na	3.2E-02	
DDE ^c	0	--	--	na	2.2E-03	--	--	na	2.2E-01	--	--	na	2.2E-04	--	--	na	2.2E-02	--	--	na	2.2E-02	
DDT ^c	0	1.1E+00	1.0E-03	na	2.2E-03	8.8E+00	3.8E-02	na	2.2E-01	2.8E-01	2.5E-04	na	2.2E-04	9.6E+00	9.5E-03	na	2.2E-02	8.8E+00	9.5E-03	na	2.2E-02	
Demeton	0	--	--	1.0E-01	na	--	--	3.8E+00	na	--	--	2.5E-02	na	--	--	9.5E-01	na	--	--	9.5E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.4E+00	6.4E+00	na	--	4.3E-02	4.3E-02	na	--	1.5E+00	1.6E+00	na	--	1.4E+00	1.6E+00	na	--	
Dibenz(a,h)anthracene ^c	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00	
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	5.9E+04	--	--	na	1.3E+02	--	--	na	5.9E+03	--	--	na	5.9E+03	
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	4.4E+04	--	--	na	9.6E+01	--	--	na	4.4E+03	--	--	na	4.4E+03	
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	8.7E+03	--	--	na	1.9E+01	--	--	na	8.7E+02	--	--	na	8.7E+02	
3,3-Dichlorobenzidine ^c	0	--	--	na	2.8E-01	--	--	na	2.9E+01	--	--	na	2.8E-02	--	--	na	2.9E+00	--	--	na	2.9E+00	
Dichlorobromomethane ^c	0	--	--	na	1.7E+02	--	--	na	1.7E+04	--	--	na	1.7E+01	--	--	na	1.7E+03	--	--	na	1.7E+03	
1,2-Dichloroethane ^c	0	--	--	na	3.7E+02	--	--	na	3.8E+04	--	--	na	3.7E+01	--	--	na	3.8E+03	--	--	na	3.8E+03	
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	3.2E+05	--	--	na	7.1E+02	--	--	na	3.2E+04	--	--	na	3.2E+04	
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	4.6E+05	--	--	na	1.0E+03	--	--	na	4.6E+04	--	--	na	4.6E+04	
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	1.3E+04	--	--	na	2.9E+01	--	--	na	1.3E+03	--	--	na	1.3E+03	
2,4-Dichlorophenoxyacetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	
1,2-Dichloropropane ^c	0	--	--	na	1.5E+02	--	--	na	1.5E+04	--	--	na	1.5E+01	--	--	na	1.5E+03	--	--	na	1.5E+03	
1,3-Dichloropropene ^c	0	--	--	na	2.1E+02	--	--	na	2.1E+04	--	--	na	2.1E+01	--	--	na	2.1E+03	--	--	na	2.1E+03	
Dieldrin ^c	0	2.4E-01	5.6E-02	na	5.4E-04	1.9E+00	2.1E+00	na	5.5E-02	6.0E-02	1.4E-02	na	5.4E-05	2.1E+00	5.3E-01	na	5.5E-03	1.9E+00	5.3E-01	na	5.5E-03	
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	2.0E+06	--	--	na	4.4E+03	--	--	na	2.0E+05	--	--	na	2.0E+05	
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	3.9E+04	--	--	na	8.5E+01	--	--	na	3.9E+03	--	--	na	3.9E+03	
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	5.0E+07	--	--	na	1.1E+05	--	--	na	5.0E+06	--	--	na	5.0E+06	
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	2.1E+05	--	--	na	4.5E+02	--	--	na	2.1E+04	--	--	na	2.1E+04	
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	2.4E+05	--	--	na	5.3E+02	--	--	na	2.4E+04	--	--	na	2.4E+04	
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	1.3E+04	--	--	na	2.8E+01	--	--	na	1.3E+03	--	--	na	1.3E+03	
2,4-Dinitrotoluene ^c	0	--	--	na	3.4E+01	--	--	na	3.5E+03	--	--	na	3.4E+00	--	--	na	3.5E+02	--	--	na	3.5E+02	
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	2.3E-06	--	--	na	5.1E-09	--	--	na	2.3E-07	--	--	na	2.3E-07	
1,2-Diphenylhydrazine ^c	0	--	--	na	2.0E+00	--	--	na	2.0E+02	--	--	na	2.0E-01	--	--	na	2.0E+01	--	--	na	2.0E+01	
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.8E+00	2.1E+00	na	4.1E+03	5.5E-02	1.4E-02	na	8.9E+00	1.9E+00	5.3E-01	na	4.1E+02	1.8E+00	5.3E-01	na	4.1E+02	
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.8E+00	2.1E+00	na	4.1E+03	5.5E-02	1.4E-02	na	8.9E+00	1.9E+00	5.3E-01	na	4.1E+02	1.8E+00	5.3E-01	na	4.1E+02	
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	1.8E+00	2.1E+00	--	--	5.5E-02	1.4E-02	--	--	1.9E+00	5.3E-01	--	--	1.8E+00	5.3E-01	--	--	
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	4.1E+03	--	--	na	8.9E+00	--	--	na	4.1E+02	--	--	na	4.1E+02	
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	6.9E-01	1.4E+00	na	2.7E+00	2.2E-02	9.0E-03	na	6.0E-03	7.5E-01	3.4E-01	na	2.7E-01	6.9E-01	3.4E-01	na	2.7E-01	
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	1.4E+01	--	--	na	3.0E-02	--	--	na	1.4E+00	--	--	na	1.4E+00	

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	9.6E+04	--	--	na	2.1E+02	--	--	na	9.6E+03	--	--	na	9.6E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	6.4E+03	--	--	na	1.4E+01	--	--	na	6.4E+02	--	--	na	6.4E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	2.4E+05	--	--	na	5.3E+02	--	--	na	2.4E+04	--	--	na	2.4E+04
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	3.8E-01	na	--	--	2.5E-03	na	--	--	9.5E-02	na	--	--	9.5E-02	na	--
Heptachlor C	0	5.2E-01	3.8E-03	na	7.9E-04	4.1E+00	1.4E-01	na	8.0E-02	1.3E-01	9.5E-04	na	7.9E-05	4.6E+00	3.6E-02	na	8.0E-03	4.1E+00	3.6E-02	na	8.0E-03
Heptachlor Epoxide C	0	5.2E-01	3.8E-03	na	3.9E-04	4.1E+00	1.4E-01	na	4.0E-02	1.3E-01	9.5E-04	na	3.9E-05	4.6E+00	3.6E-02	na	4.0E-03	4.1E+00	3.6E-02	na	4.0E-03
Hexachlorobenzene C	0	--	--	na	2.9E-03	--	--	na	3.0E-01	--	--	na	2.9E-04	--	--	na	3.0E-02	--	--	na	3.0E-02
Hexachlorobutadiene C	0	--	--	na	1.8E+02	--	--	na	1.8E+04	--	--	na	1.8E+01	--	--	na	1.8E+03	--	--	na	1.8E+03
Hexachlorocyclohexane																					
Alpha-BHC C	0	--	--	na	4.9E-02	--	--	na	5.0E+00	--	--	na	4.9E-03	--	--	na	5.0E-01	--	--	na	5.0E-01
Hexachlorocyclohexane																					
Beta-BHC C	0	--	--	na	1.7E-01	--	--	na	1.7E+01	--	--	na	1.7E-02	--	--	na	1.7E+00	--	--	na	1.7E+00
Hexachlorocyclohexane																					
Gamma-BHC C (Lindane)	0	9.5E-01	na	na	1.8E+00	7.6E+00	--	na	1.8E+02	2.4E-01	--	na	1.8E-01	8.3E+00	--	na	1.8E+01	7.6E+00	--	na	1.8E+01
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	5.0E+04	--	--	na	1.1E+02	--	--	na	5.0E+03	--	--	na	5.0E+03
Hexachloroethane C	0	--	--	na	3.3E+01	--	--	na	3.4E+03	--	--	na	3.3E+00	--	--	na	3.4E+02	--	--	na	3.4E+02
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	7.6E+01	na	--	--	5.0E-01	na	--	--	1.9E+01	na	--	--	1.9E+01	na	--
Indeno (1,2,3-cd) pyrene C	0	--	--	na	1.8E-01	--	--	na	1.8E+01	--	--	na	1.8E-02	--	--	na	1.8E+00	--	--	na	1.8E+00
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone C	0	--	--	na	9.6E+03	--	--	na	9.8E+05	--	--	na	9.6E+02	--	--	na	9.8E+04	--	--	na	9.8E+04
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Lead	0	1.8E+02	2.1E+01	na	--	1.4E+03	7.8E+02	na	--	4.5E+01	5.1E+00	na	--	1.6E+03	1.9E+02	na	--	1.4E+03	1.9E+02	na	--
Malathion	0	--	1.0E-01	na	--	--	3.8E+00	na	--	--	2.5E-02	na	--	--	9.5E-01	na	--	--	9.5E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.1E+01	2.9E+01	--	--	3.5E-01	1.9E-01	--	--	1.2E+01	7.3E+00	--	--	1.1E+01	7.3E+00	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	6.8E+04	--	--	na	1.5E+02	--	--	na	6.8E+03	--	--	na	6.8E+03
Methylene Chloride C	0	--	--	na	5.9E+03	--	--	na	6.0E+05	--	--	na	5.9E+02	--	--	na	6.0E+04	--	--	na	6.0E+04
Methoxychlor	0	--	3.0E-02	na	--	--	1.1E+00	na	--	--	7.5E-03	na	--	--	2.8E-01	na	--	--	2.8E-01	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Nickel	0	2.4E+02	2.7E+01	na	4.6E+03	1.9E+03	1.0E+03	na	2.1E+05	6.0E+01	6.7E+00	na	4.6E+02	2.1E+03	2.5E+02	na	2.1E+04	1.9E+03	2.5E+02	na	2.1E+04
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	3.1E+04	--	--	na	6.9E+01	--	--	na	3.1E+03	--	--	na	3.1E+03
N-Nitrosodimethylamine C	0	--	--	na	3.0E+01	--	--	na	3.1E+03	--	--	na	3.0E+00	--	--	na	3.1E+02	--	--	na	3.1E+02
N-Nitrosodiphenylamine C	0	--	--	na	6.0E+01	--	--	na	6.1E+03	--	--	na	6.0E+00	--	--	na	6.1E+02	--	--	na	6.1E+02
N-Nitrosodi-n-propylamine C	0	--	--	na	5.1E+00	--	--	na	5.2E+02	--	--	na	5.1E-01	--	--	na	5.2E+01	--	--	na	5.2E+01
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.2E+02	2.5E+02	na	--	7.0E+00	1.7E+00	--	--	2.5E+02	6.2E+01	--	--	2.2E+02	6.2E+01	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	5.2E-01	4.9E-01	na	--	1.6E-02	3.3E-03	na	--	5.7E-01	1.2E-01	na	--	5.2E-01	1.2E-01	na	--
PCB Total C	0	--	1.4E-02	na	6.4E-04	--	5.3E-01	na	6.5E-02	--	3.5E-03	na	6.4E-05	--	1.3E-01	na	6.5E-03	--	1.3E-01	na	6.5E-03
Pentachlorophenol C	0	5.5E+00	4.1E+00	na	3.0E+01	4.4E+01	1.5E+02	na	3.1E+03	1.3E+00	1.0E+00	na	3.0E+00	4.7E+01	3.9E+01	na	3.1E+02	4.4E+01	3.9E+01	na	3.1E+02
Phenol	0	--	--	na	8.6E+05	--	--	na	3.9E+07	--	--	na	8.6E+04	--	--	na	3.9E+06	--	--	na	3.9E+06
Pyrene	0	--	--	na	4.0E+03	--	--	na	1.8E+05	--	--	na	4.0E+02	--	--	na	1.8E+04	--	--	na	1.8E+04
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	1.6E+02	1.9E+02	na	1.9E+05	5.0E+00	1.3E+00	na	4.2E+02	1.8E+02	4.7E+01	na	1.9E+04	1.6E+02	4.7E+01	na	1.9E+04
Silver	0	6.0E+00	--	na	--	4.8E+01	--	na	--	1.5E+00	--	na	--	5.3E+01	--	na	--	4.8E+01	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	--	--	--	--	na	--
1,1,2,2-Tetrachloroethane ^C	0	--	--	na	4.0E+01	--	--	na	4.1E+03	--	--	na	4.0E+00	--	--	na	4.1E+02	--	--	na	4.1E+02
Tetrachloroethylene ^C	0	--	--	na	3.3E+01	--	--	na	3.4E+03	--	--	na	3.3E+00	--	--	na	3.4E+02	--	--	na	3.4E+02
Thallium	0	--	--	na	4.7E-01	--	--	na	2.1E+01	--	--	na	4.7E-02	--	--	na	2.1E+00	--	--	na	2.1E+00
Toluene	0	--	--	na	6.0E+03	--	--	na	2.7E+05	--	--	na	6.0E+02	--	--	na	2.7E+04	--	--	na	2.7E+04
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Toxaphene ^C	0	7.3E-01	2.0E-04	na	2.8E-03	5.8E+00	7.6E-03	na	2.9E-01	1.8E-01	5.0E-05	na	2.8E-04	6.4E+00	1.9E-03	na	2.9E-02	5.8E+00	1.9E-03	na	2.9E-02
Tributyltin	0	4.6E-01	7.2E-02	na	--	3.7E+00	2.7E+00	na	--	1.2E-01	1.8E-02	na	--	4.0E+00	6.8E-01	na	--	3.7E+00	6.8E-01	na	--
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	3.2E+03	--	--	na	7.0E+00	--	--	na	3.2E+02	--	--	na	3.2E+02
1,1,2-Trichloroethane ^C	0	--	--	na	1.6E+02	--	--	na	1.6E+04	--	--	na	1.6E+01	--	--	na	1.6E+03	--	--	na	1.6E+03
Trichloroethylene ^C	0	--	--	na	3.0E+02	--	--	na	3.1E+04	--	--	na	3.0E+01	--	--	na	3.1E+03	--	--	na	3.1E+03
2,4,6-Trichlorophenol ^C	0	--	--	na	2.4E+01	--	--	na	2.4E+03	--	--	na	2.4E+00	--	--	na	2.4E+02	--	--	na	2.4E+02
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Vinyl Chloride ^C	0	--	--	na	2.4E+01	--	--	na	2.4E+03	--	--	na	2.4E+00	--	--	na	2.4E+02	--	--	na	2.4E+02
Zinc	0	1.5E+02	1.6E+02	na	2.6E+04	1.2E+03	5.9E+03	na	1.2E+06	3.9E+01	3.9E+01	na	2.6E+03	1.4E+03	1.5E+03	na	1.2E+05	1.2E+03	1.5E+03	na	1.2E+05

Notes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
- Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipal
- Metals measured as Dissolved, unless specified otherwise
- "C" indicates a carcinogenic parameter
- Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
Antidegradation WLAs are based upon a complete mix.
- Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
= (0.1(WQC - background conc.) + background conc.) for human health
- WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	2.9E+03
Arsenic	8.5E+02
Barium	na
Cadmium	8.3E+00
Chromium III	5.5E+02
Chromium VI	5.1E+01
Copper	5.8E+01
Iron	na
Lead	1.2E+02
Manganese	na
Mercury	4.4E+00
Nickel	1.5E+02
Selenium	2.8E+01
Silver	1.9E+01
Zinc	4.9E+02

Note: do not use QL's lower than the minimum QL's provided in agency guidance

3.500 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGD) 3.500				Ammonia - Dry Season - Acute	Ammonia - Dry Season - Chronic																																				
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3.500 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

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<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Stream/Discharge Mix Values</th> <th>Dry Season</th> <th>Wet Season</th> </tr> <tr> <td>1Q10 90th% Temp. Mix (deg C)</td> <td>23.526</td> <td>14.396</td> <td></td> </tr> <tr> <th>Allocated to Mix (MGD)</th> <th>Stream + Discharge (MGD)</th> <th>Dry Season</th> <th>Wet Season</th> </tr> </thead> <tbody> <tr> <td>30Q10 90th% Temp. Mix (deg C)</td> <td>23.522</td> <td>14.366</td> <td></td> </tr> <tr> <td>1Q10 90th% pH Mix (SU)</td> <td>7.997</td> <td>7.998</td> <td></td> </tr> <tr> <td>30Q10 90th% pH Mix (SU)</td> <td>7.997</td> <td>7.998</td> <td></td> </tr> <tr> <td>1Q10 10th% pH Mix (SU)</td> <td>6.509</td> <td>N/A</td> <td></td> </tr> <tr> <td>7Q10 10th% pH Mix (SU)</td> <td>6.508</td> <td>N/A</td> <td></td> </tr> </tbody> </table>				Stream/Discharge Mix Values		Dry Season	Wet Season	1Q10 90th% Temp. Mix (deg C)	23.526	14.396		Allocated to Mix (MGD)	Stream + Discharge (MGD)	Dry Season	Wet Season	30Q10 90th% Temp. Mix (deg C)	23.522	14.366		1Q10 90th% pH Mix (SU)	7.997	7.998		30Q10 90th% pH Mix (SU)	7.997	7.998		1Q10 10th% pH Mix (SU)	6.509	N/A		7Q10 10th% pH Mix (SU)	6.508	N/A		Trout Present Criterion (mg N/L) 5.642 Trout Absent Criterion (mg N/L) 8.447 Trout Present? n Effective Criterion (mg N/L) 8.447	Early LS Present Criterion (mg N/L) 2.441 Early LS Absent Criterion (mg N/L) 2.465 Early Life Stages Present? y Effective Criterion (mg N/L) 2.441				
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7/8/2016 11:23:59 AM

Facility = LJRR WWTP 3.5 MGD
Chemical = Ammonia
Chronic averaging period = 30
WLAA = 68.1
WLAC = 13.2
Q.L. = 0.02
samples/mo. = 30
samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

	A	B	C	D	E	F	G	H	I	J	K	L	M														
1	Spreadsheet for determination of WET test endpoints or WET limits																										
2																											
3																											
4	Excel 97																										
5	Revision Date: 01/10/05																										
6	File: WETLIM10.xls																										
7	(MIX.EXE required also)																										
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15	Enter data in the cells with blue type:																										
16																											
17	Entry Date:	06/14/11																									
18	Facility Name:	Lower Jackson River																									
19	VPDES Number:	VA0090671																									
20	Outfall Number:	001																									
21																											
22	Plant Flow:	2.6 MGD																									
23	Acute 1Q10:	119 MGD			20.4 %																						
24	Chronic 7Q10:	129 MGD			100 %																						
25																											
26	Are data available to calculate CV? (Y/N)	N			(Minimum of 10 data points, same species, needed)																						
27	Are data available to calculate ACR? (Y/N)	N			(NOEC<LC50, do not use greater/less than data)																						
28																											
29	IWC _a	9.67405864 %			Plant flow/plant flow + 1Q10																						
30	IWC _c	1.975683891 %			Plant flow/plant flow + 7Q10																						
31	Dilution, acute	10.33692308			100/IWC _a																						
32	Dilution, chronic	50.61538462			100/IWC _c																						
33	WLA _a	3.101076923 Instream criterion (0.3 TU _a) X's Dilution, acute																									
34	WLA _c	50.61538462 Instream criterion (1.0 TU _c) X's Dilution, chronic																									
35	WLA _{a,c}	31.01076923 ACR X's WLA _a - converts acute WLA to chronic units																									
36	ACR -acute/chronic ratio	10 LC50/NOEC (Default is 10 - if data are available, use tables Page 3)																									
37	CV-Coefficient of variatior	0.6 Default of 0.6 - if data are available, use tables Page 2)																									
38	Constants eA	0.4109447 Default = 0.41																									
39	eB	0.6010373 Default = 0.60																									
40	eC	2.4334175 Default = 2.43																									
41	eD	2.4334175 Default = 2.43 (1 samp) No. of sample: 1 **The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTA _{a,c} and MDL using it are driven by the ACR.																									
42	LTA _{a,c}	12.74371126 WLA _{a,c} X's eA																									
43	LTA _c	30.42173411 WLAc X's eB																									
44	MDL** with LTA _{a,c}	31.01076999 TU _c			NOEC = 3.224686 (Protects from acute/chronic toxicity)																						
45	MDL** with LTA _c	74.02878016 TU _c			NOEC = 1.350826 (Protects from chronic toxicity)																						
46	AML with lowest LTA	31.01076999 TU _c			NOEC = 3.224686 Lowest LTA X's eD																						
47	IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU _c to TU _a																										
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49																											
50																											
51																											
52																											
53																											
54																											
55	MDL with LTA _{a,c}	3.101076999 TU _a			LC50 = 32.246861 %																						
56	MDL with LTA _c	7.402878016 TU _a			LC50 = 13.508260 %																						
57																											
58																											

NOTE: If the IWC_a is >33%, specify the NOAEC = 100% test/endpoint for use

	A	B	C	D	E	F	G	H	I	J	K	L	M	
110	Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)													
111	To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC ₅₀ , since the ACR divides the LC ₅₀ by the NOEC. LC ₅₀ 's >100% should not be used.													
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Table 1. ACR using Vertebrate data

ACR for vertebrate data: 0

Table 2. ACR using Invertebrate data

DILUTION SERIES TO RECOMMEND

Table 4.

	Monitoring % Effluent	Limit % Effluent
Dilution series based on data mean	7.8	12.743711
Dilution series to use for limit		4
Dilution factor to recommend:	0.2801251	0.2
Dilution series to recommend:	100.0	100.0
	28.0	20.0
	7.8	4.0
	2.2	1.2500
	0.62	0.2
Extra dilutions if needed	0.17	3125.00
	0.05	15625.00

Convert LC₅₀'s and NOEC's to C for use in WLA.EXE

Table 3. ACR used: 10

Enter LC ₅₀	TUc	Enter NOEC
1	NO DATA	
2	NO DATA	
3	NO DATA	
4	NO DATA	
5	NO DATA	
6	NO DATA	
7	NO DATA	
8	NO DATA	
9	NO DATA	
10	NO DATA	
11	NO DATA	
12	NO DATA	
13	NO DATA	
14	NO DATA	
15	NO DATA	
16	NO DATA	
17	NO DATA	
18	NO DATA	
19	NO DATA	
20	NO DATA	

If WLA.EXE determines that an acute limit is needed convert the TUc answer you get to TUa and then an

enter it here: %LC₅₀

NO DATA TUa

APPENDIX D

TMDL Assessment Information



2012 Impaired Waters

Category 4 & 5 by 2012 Impaired Area ID*

James River Basin

Cause Group Code: **I09R-01-BEN - Jackson River**

Location:	Jackson River mainstem from the Westvaco main processing outfall downstream to the confluence of the Jackson and Cowpasture Rivers.
City/County	Alleghany Co., Covington City
Use(s):	Aquatic Life
Cause(s) / VA Category:	Benthic-Macroinvertebrate Bioassessments / 4A

The Jackson River General Standard - Benthic TMDL received U.S. EPA approval on 7/21/2010. The SWCB approved the Benthic TMDL on 12/9/2010. Federal IDs follow below by 2012 Assessment Units. The original 1996 VAW-I04R and VAW-I09R impairments were combined into one in 2002.

The 1996/1998 originally 303(d) Listed impairments to the benthic community are believed due to nutrient and organic enrichment (deposition) for 24.18 miles. Based on previous ambient station solids data, the nutrients and organics are mainly dissolved. Maxima have been greatly reduced since 1996.

The waters are partially de-listed (shortened- Category 2C) for 9.81 miles from the mouth of Karnes Creek downstream to the confluence of the Cowpasture and Jackson Rivers. The de-listing is based on Virginia Stream Condition Index (VSCI) scores of the 1996-1998 Listed reach currently achieving VSCI scores above 60 from station 2-JKS006.67. VSCI scores at 2-JKS006.67 have steadily increased since 2001. Improvements at discharging facilities have had a positive effect on the benthic community. Both the 2006 and 2012 flow adjusted trend analysis show a significant declining trend for total phosphorus and total nitrogen in both upstream station 2-JKS023.61 and downstream station 2-JKS000.38. 2007 - 2010 VSCI scores from four surveys have an average of 64.10. Benthic trend analysis also shows improving conditions at 2-JKS006.67 (+10 points) over the time period of 1994 - 2010. The VSCI is a multi-metric statewide stream index of biotic integrity that is based on data collected from minimally impacted reference sites throughout Virginia. This index shows that an SCI score of 60.0 is the lower limit for reference (or, unimpacted) conditions in a benthic community.

Federal IDs by Assessment Unit:

VAW-I04R_JKS01A00 - Total Phosphorus - 38981. Total Nitrogen - 39001.
 VAW-I09R_JKS01A00 - Total Phosphorus - 39017. Total Nitrogen - 39022. De-list 2012- 3.48 miles.
 VAW-I09R_JKS02A00 - Total Phosphorus - 38996. Total Nitrogen - 39003. De-list 2012- 1.71 miles.
 VAW-I09R_JKS03A00 - Total Phosphorus - 38997. Total Nitrogen - 39004. De-list 2012- 4.62 miles.
 VAW-I09R_JKS03B10 - Total Phosphorus - 38997. Total Nitrogen - 39004.
 VAW-I09R_JKS04A00 - Total Phosphorus - 38995. Total Nitrogen - 39002.
 VAW-I09R_JKS05A00 - Total Phosphorus - 38998. Total Nitrogen - 39005.
 VAW-I09R_JKS06A00 - Total Phosphorus - 38999. Total Nitrogen - 39006.

2012 Benthic Assessment station locations are:

2-JKS000.38 - Rt. 727 Bridge - near Iron Gate (I09R)
 2-JKS006.67 - Low Water Bridge - near Dabney Lancaster CC (I09R)
 2-JKS013.29 - Off Rt. 696 above Lowmoor (I09R)
 2-JKS018.68 - Rt. 18 Bridge at Covington (I09R)
 2-JKS020.41 - Upper Horse Shoe at Rayon Terrace (I09R)
 2-JKS022.78 - Fudge's Bridge, Rt. 154, Covington (I09R)
 2-JKS023.61 - City Park - Covington at gage (I09R)

General Standard (Benthic):

2-JKS023.61-Bio 'IM' The 2012 data window reports an average Virginia Stream Condition Index (VSCI) score of 35.95 from five surveys (2006-2008 & 2010). The lowest score occurs in spring 2007 at 32.92 and the highest 38.47 fall 2008. Seven VSCI surveys (2003 - 2008) for 2010 have an average score of 45.15 with the lowest score in spring 2007 32.92 and highest score 57.38 spring 2004. The 2008 Integrated Report (IR) assessed seven VSCI surveys (2001 - 2006) with an average score of 34.36; lowest score spring 2001 at 31.03 and highest score 52.38 spring 2004. The invertebrate community at this site has been dominated by taxa that are tolerant of environments with low dissolved oxygen and high levels of organic pollution (i.e.

Tubificidae, Tricladida, Chironomidae, Lumbriculidae and Simuliidae). The VSCI scores display a negative alteration in the taxonomic diversity and pollution sensitivity of the benthic community. Recent improvement in the historical trend of the benthic community may be due to a reduction in cooling water discharges and efforts in the watershed to reduce nutrient discharge to the river. However, a recently discovered and repaired sewer line contributed pollution to the river and may be responsible for the VSCI decline since 2007.

Both 2006 and 2012 flow adjusted trend analysis find significant declining trends for total phosphorus and total nitrogen at 2-JKS023.61. The 2012 data window finds five of 41 total phosphorus samples are elevated above 0.20 mg/l ranging from 0.24 to 0.52 mg/l; although maxima are reduced. An 'Observed effect' is noted for these waters. Past values above 0.20 have been greater than 1.40 mg/l. The 2010 assessment finds elevated total phosphorus levels in six of 40 samples are above 0.20 mg/l. The maximum value is 0.40 mg/l and the lowest 0.28 mg/l. 2008 elevated total phosphorus levels were 17 of 51 samples- 'Observed Effect'. The maximum value is 1.40 mg/l and the lowest 0.23 mg/l.

2-JKS022.78- There are no additional data beyond the 2010 Integrated Report (IR) where elevated TP values greater than 0.20 mg/l are found in two of 12 samples with excessive values at 0.28 and 0.39 mg/l.

2-JKS020.41- A 2007 probability station. Bio 'IM' Two VSCI surveys (2007), average score 48.13. The invertebrate community at this site is dominated by taxa that are tolerant of environments with low dissolved oxygen and high levels of organic pollution (i.e. Tricladida and Asellidae).

2-JKS018.68- Bio 'IM' The 2012 assessment finds from five surveys (2006-2008 & 2010) an average score of 50.37. Five VSCI surveys within the 2010 data window (2004, 2006-2008) have an average score of 54.28. The 2008 assessment reports two VSCI scores from the fall of 2004 (67.3) and 2006 (51.8). The benthic community shows some improvement at this station relative to the station at City Park (2-JKS023.61). However, the benthic community remains dominated by pollution tolerant taxa.

Two total phosphorus observations are elevated within the 2012 data window from 22 samples. Samples greater than 0.20 mg/l are 0.22 and 0.30 mg/l. The 2010 assessment finds two of 16 total phosphorus observations are elevated with excessive values the same as 2012. 2008 assessment TP results find no elevated TP levels above 0.20 mg/l from nine observations (no additional data). The 2006 IR reported six of 18 observations greater than 0.20 mg/l. Elevated TP values ranged from 0.30 to 0.70 mg/l- 'Observed Effect'.

2-JKS013.29- The average VSCI score within the 2012 data window (2006-2008 & 2010) is 54.04. The lowest score is 36.68 (spring 2007) and the highest 61.26 (fall 2006). 2010 results also find an impaired condition with the lowest at 38.6; fall 2004 and the highest 61.26; fall 2006 from six VSCI survey scores (2003, 2004, 2006 & 2007). Lower VSCI scores are the result of the low taxonomic diversity and lack of pollution sensitive taxa. The 2008 IR found impairment from four VSCI surveys (2003 - 2004 & 2006). The Low Moor station through the 2008 assessment has consistently had lower assessment scores and higher numbers of pollution tolerant organisms than at 2-JKS018.68. The 2006 sample showed an increase in pollution sensitive taxa and a decrease in pollution tolerant taxa.

One TP observation from a total of six is greater than 0.20 mg/l at 0.43 mg/L in 2012. There are no additional total phosphorous data within the 2010 data window. 2008 elevated TP samples are found in six of 12 samples with excessive values ranging from 0.29 to 1.41 mg/l- 'Observed Effect'.

2-JKS006.67- Bio 'FS' The 2012 assessment finds 'full support' from four VSCI surveys (2007-2008 & 2010) with an average score of 64.1. 2010 results also find 'full support' from six VSCI surveys (2003-2008) with an average score of 61.2. Benthic trend analysis also shows improving conditions (+10 points) over the time period of 1994 - 2010. VSCI scores have increased by 14 points from 2000-2005; and with an additional increase of 11 points from 2006-2010. There have been slight differences in scores over the current six-year period. Spring scores have been lower than fall scores. Lower VSCI scores are the result of the decrease in pollution sensitive taxa. Recent improvements in the benthic community may be due to a reduction in cooling water discharges and efforts to reduce nutrient discharge to the river. A recently discovered and repaired sewer line may be responsible for the VSCI decline since 2007. The waters in this portion of the original 303(d) Listing (9.81 miles) are delisted with the 2012 assessment based on VSCI scores from both the 2010 and 2012 assessments, Benthic trend analysis and 2006 / 2012 flow adjusted trend analysis at upstream station 2-JKS023.61 and downstream station 2-JKS000.38.

2-JKS000.38- 2006 and 2012 flow adjusted trend analysis reveals significant declining trends in total phosphorus and total nitrogen at this station. The 2012 Integrated Report (IR) finds no elevated TP observations (greater than 0.20 mg/L) from 36 samples. The 2010 assessment finds a single elevated TP observation from 38 observations at 0.22 mg/l. The 2008 assessment reported elevated TP observations in 15 of 50 observations- 'Observed Effect'. Values above 0.20 mg/l range from 0.22 to 1.24 mg/l.

Assessment Unit	Water name	Location Description	Cause Category	Cause Name	Cycle First Listed	TMDL Schedule	Size
VAW-I04R_JKS01A00	Jackson River	Jackson River mainstem from the Westvaco main processing outfall downstream to Dunlap Creek mouth at the watershed boundary with I09R.	4A	Benthic-Macroinvertebrate Bioassessments	1996	2010	0.46

VAW-I09R_JKS03B10	Jackson River	Jackson River mainstem from upstream of the Lowmoor community downstream to near the mouth of Karnes Creek.	4A	Benthic-Macroinvertebrate Bioassessments	1996	2010	3.18
VAW-I09R_JKS04A00	Jackson River	Jackson River mainstem from the Covington STP outfall downstream to just above the Lowmoor community.	4A	Benthic-Macroinvertebrate Bioassessments	1996	2010	5.81
VAW-I09R_JKS05A00	Jackson River	Jackson River mainstem from downstream of the Lexington Avenue Bridge to the City of Covington STP outfall on the Jackson River.	4A	Benthic-Macroinvertebrate Bioassessments	1996	2010	3.26
VAW-I09R_JKS06A00	Jackson River	Jackson River mainstem from the watershed boundary (I04R) at the mouth of Dunlap Creek downstream to just below the Lexington Avenue Bridge.	4A	Benthic-Macroinvertebrate Bioassessments	1996	2010	1.66

Jackson River	Estuary (sq. miles)	Reservoir (acres)	River (miles)
Impaired area ID: VAW-I04R-01	Benthic-Macroinvertebrate Bioassessments / 4A		
	Total impaired size by water type:		14.37

Aquatic Life**Sources:**

- Industrial Point Source Discharge
- Municipal (Urbanized High Density Area)
- Municipal Point Source Discharges

* Narrative descriptions, location and city/county describe the entire extent of the impairment. Sizes may not represent the total size of the impairment.